SKETCHPAD LISTINGS

IVAN E. SUTHERLAND

EQUALITIES

1

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                  FRE  SRV7   005

ATPOINT=SKM 3.2 200044                  = 1762200044
ATLINE=SKM 3.3 200044           5920    = 1763200044
ATCIRCLE=SKM 3.4 200044           /     = 1764200044
AFFB= LIST                              =      24000
ATILL=SKM 3.5 200044                    = 1765200044
ATICL=SKM 3.6 200044                    = 1766200044
ATICC=SKM 3.7 200044                    = 1767200044
ATBITS= 200044                          =     200044
ATINS=SKM 3.8 ATBITS                    = 1770200044
ATATAP= 2    **ATTACHER THING           =          2

BWHOS= 4     **TO WHICH PICTURE BLOCK BELONGS
                                        =          4


CVAL= 16     ** CIRCLE ANGLE AND RADIUS =         16
CSQ=RFD 8+1                             =3012000000001
CIRCEN= 14   ** CIRCLE CENTER           =         14
CSP= 10      ** CIRCLE START POINT      =         10
CEP= 12      ** CIRCLE END POINT        =         12
CIRCLES= 2*MASBL+PICTURES               =      24225
CVTS= 6      ** VARIABLE TO MOVE TO SATISFY THIS
                                        =          6

COPYNUM= NITOG                          =     377725
CPNAME= 200054                          =     200054
CCMP= 16     **CONSTRAINT COMPUTATION ROUTINE
                                        =         16

CHVAR= 20    **# CHANGABLE VARIABLES    =         20
CURPICS= 15*SMASBL+LIST+1               =      24117
CONSTRAINTS= 4*SMASBL+LIST+1            =      24031
CONLET= 12   **CONSTRAINT LETTER DESIGNATOR
                                        =         12


DESIGNATED=SKM 4.10 PAGE1               = 1712011547
DEADS= 11*SMASBL+LIST+1                 =      24067
DISPLAYK= 2                             =          2
DISPLAY= 5   **MASTER DISPLAY SUBROUTINE =         5
DESIGS= 13*SMASBL+LIST+1                =      24103

ERRORSTOP=SKM 4.10 377730               = 1712377730

FREES= 5*SMASBL+LIST+1                  =      24037
FREEDOMS= 6*SMASBL+LIST+1               =      24045
FIXEDS= 12*SMASBL+LIST+1                =      24075

GETIT= 7     **MASTER FORMATION SUBROUTINE
                                        =          7

*GORREXIT= MGPERROR                     =      11164

HCVP2= 12    ** SECOND HORIZ OR VERT POINT
                                        =         12
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              FRE  SRV7  006
  HOVPI= 10   ** FIRST HORIZ OR VERT POINT
                                              =        10

  HOVCODE= 14 ** HORIZ=1, VERTICAL=2, EITHER=0
                                              =        14

  HOVS= 15*MASBL+PICTURES                     =     24561
  HOWBIG= 6   **MASTER SCSZ COMPUTATION       =         6
  HOLDERS= 2*SMASBL+LIST+1                    =     24015

  IWHAT= 14   ** WHAT PIC THIS IS INSTANCE OF
                                              =        14

  INSTANCES= 6*MASBL+PICTURES                 =     24345
  ISIZE= 16   ** R                            =        16
  IPCONS= 11*MASBL+PICTURES         .         =     24441
  IPCP= 10    **POINT IN INSTANCE-POINT CONSTRAINT
                                              =        10

  IPCI= 12    ** INSTANCE IN INSTANCE-POINT CONSTRAIN
                          T                   =        12

  IPCV= 14    ** VIRGIN POINT IN INSTANCE-POINT CONST
                          RAINT               =        14

  IPCOTP= 16  ** INSTANCE-POINT CONSTRAINTS WITH THIS
                          VIRGIN              =        16
  IBVERTS= 14*MASBL+PICTURES                  =     24535
  IBVW= 10    ** WHICH INSTANCE IS VERTICAL
                                              =        10

  IP= LIST+IVAL+2                             =     24022
  IVAL= 20    ** R COS θ, R SIN θ, X, Y       =        20
  IBVCODE= 12 ** INSTANCE TO BE VERTICAL, HORIZ, ETC
                                              =        12


  JUNKK= 3                                    =         3

  KIND= 13    ** 1=NOT IN PIC, 2=PPART, 3=PICBLKS
                                              =        13

  KEYSTART= 200076                            =    200076

  LIST= 24000 **LIST STRUCTURE START          =     24000
  LSP= 10     **START OF LINE                 =        10
  LEP= 12     **END OF LINE                   =        12
  LPLOST=SKM 4.10 200042                      = 1712200042
  LINES= 1*MASBL+PICTURES                     =     24201
 *LGORR1=                                     =     11476
 *LGORR0=                                     =     11472
 *LGORREND=                                   =     11504
 *LGORR2=                                     =     11503

  MASBL= 24   **MASTER BLOCK LENGTH           =        24
  MOVED=SKM 4.10 SCSZ                         = 1712200034
  MOVINGDONE=SKM 4.10 200061                  = 1712200061
  MASTERS= LIST+1                             =     24001
  MERGERS= 10*SMASBL+LIST+1                   =     24061
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                 FRE  SRV7  007
META= 12                                          =        12
MATM= MATS+1        **MAIN DIAG OF TRANSFORMATION
                                                  =    200071
MATS= 200070        **TRANSFORMATION SIZE =            200070
MATD= MATS+5        **DENOMINATOR OF TRANSFORMATION
                                                  =    200075
MATRX= MATS+3       **X TRANSLATION OF TRANSFORMATIO
                          N                       =    200073
MATO= MATS+2        **OFF DIAG OF TRANSFORMATION
                                                  =    200072
MATRY= MATS+4       **Y TRANSLATION OF TRANSFORMATIO
                          N                       =    200074
MOVIT= 10    **HOW TO MOVE COORDINATES            =        10
MOVINGS= 14*SMASBL+LIST+1                         =     24111

NITOG= 377725                                     =    377725
NUMBERS= 10*MASBL+PICTURES                        =     24415
NAFFB= NLIST                                      =     23000
NLIST= 23000        **MODEL EMPTY LIST STRUCTURE
                                                  =     23000
NTOSHO= 14   ** SCALER TO BE SHOWN                =        14
NVAL= 16      ** R COS ø, R SIN ø, X, Y           =        16
NCON= 17      **# CONSTRAINTS SHOWN               =        17
NEWCONS= 16*SMASBL+LIST+1                         =     24125
NAME= 4       **NAME OF HEADER BLOCKS             =         4
NEWCONTOG= 377725                                 =    377725

ONCIRCLES= 13*MASBL+PICTURES                      =     24511
ORIGIN= 4000                                      =      4000
ONLIÑES= 12*MASBL+PICTURES                        =     24465
ORDISW=SKM 1.1 ORDSWITCHES                        = 1721010774
ORDWORST=SKM 4.10 ORDSTARTW                       = 1712004260
ORDC?= ORDCALCEXIT                                =     10461

PICTURES= 22*SMASBL+LIST+1                        =     24155
PLS= 14       ** LINES ND CIRCLES ON THIS POINT
                                                  =        14
PVAL= 20      ** COORDINATES OF POINT             =        20
POINTS= 4*MASBL+PICTURES                          =     24275
PSPL= 200042                                      =    200042
PNAME= 17     **NAME OF PICTURE, 36 BITS          =        17
PSIZE= 16     **SIZE OF THIS PICTURE              =        16
PPART= 4      **PICTURE PARTS                     =         4
PINS= 14      **INSTANCES OF THIS PICTURE =                14
PATAP= 12     **ATTACHERS OF THIS PICTURE =                12
PPARTM= 10    **MOVING PICTURE PARTS              =        10
PBCLE= 10     ** END POINT OF LINE                =        10
PBCLS= 12     ** START OF POINT ON LINE           =        12
PBCCC= 10     ** CENTER OF POINT ON CIRCLE
                                                  =        10
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 *
                  FRE  SRV7   010

 PBCCS= 12    ** START OF POINT ON CIRCLE =          12
 PBCCP= 14    ** POINT TO BE ON CIRCLE     =         14
 PBCLP= 14    ** POINT TO BE ON LINE       =         14
 PSAVE= 20    **6 REGISTERS TO SAVE IN PICTURE
                                           =         20
 PICBLKS= 2  **NON PICTURE STUFF IN PICTURE
                                           =          2
 PICTUREK= 1                               =          1
 PYTHAGORIAN= 200007                       =     200007
 PWHOS= 6      **PICTURE IN PICTURES       =          6

 RIBMN= 200121                             =     200121
 RIBM= 200120                              =     200120

 SMASBL= 6    **SMALL MASTER BLOCK LENGTH FOR DESIGNA
                         TERS              =          6
 SCSZ= 200034                              =     200034
 SCCEN= 200035                             =     200035
 S= 7                                      =          7
 START76= 200067                           =     200067
 SWITCH= 377621                            =     377621
 SIZE= 11      **SIZE OF BLOCK             =         11
 SCALERS= 3*MASBL+PICTURES                 =      24251
 SPECB= 2      **SPECIFIC BLOCKS           =          2
 SSHOW= 14     ** NUMBERS SHOWING THIS SCALER
                                           =         14
 SVAL= 16      ** VALUE OF SCALER          =         16
 SHAFTUSE=SKM 4,10 200055                  = 1712200055
*SUBR1=                                    =      11506

 TYPE= 0       **TIES TO SPECB IN MASTER BLOCK
                                           =          0
 T= 10                                     =         10
 TEXTS= 7*MASBL+PICTURES                   =      24371
 TVAL= 14      ** R COS a, R SIN a, X, Y   =         14
 TXTS= 20      ** POINTER TO TEXT SHOWN    =         20
 TUPLE= 14     **# VARIABLES               =         14
 TCL= 2000                                 =       2000
 TPVAL= 14     **X,Y LOCATION              =         14
 TPVALS= 5*MASBL+PICTURES **TYPICAL VARIABLES
                                           =      24321
 TOPCS= 3*SMASBL+LIST+1                    =      24023
*T1=                                       =      11473
*T2=                                       =      11505
*T3=                                       =      11500

 VCON= 12      ** CONSTRAINTS ON THIS VARIABLE
                                           =         12
 VFLW= 10      ** CONSTRAINTS WHICH THIS VARIABLE IS T
                         O SATISFY         =         10
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              FRE   SRV7   011

VORD= 6      **ORDERING OF VARIABLES           =          6
VA= LIST+PVAL                                  =      24020
VARLOC= 15   **LOCATION OF VARIABLES IN BLZZK
                                               =         15

VARIABLES= 1*SMASBL+LIST+1                     =      24007


WORKS= 7*SMASBL+LIST+1                         =      24053
WIBM= 200122                                   =     200122
WIBMN= 200123                                  =     200123
WHERE= 12    **LOCATION OF THING IN PICTURE
                                               =         12


y= 3                                           =          3

a= 1                                           =          1

d= 4                                           =          4

c= 5                                           =          5

b= 2                                           =          2

l= 6                                           =          6
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IES 2XMX 001

BUILD

47BOTH=004114	-LGORR	ORDP3=010556
*47BUT=011416	-LGORL	ORDP=010571
47EIR=004100	-LGORRI	ORDP1=010406
47FIXL=004025	-LGORLI	ORDPEXIT=010464
47FIXL1=004043	*LGORR1	ORDP1A=010423
47LITEIT=004072	*LGORR0	ORDP2=010451
47LITE1=004077	*LGORREND	ORDP4=010457
47LOSTPEN=004122	*LGORR2	ORDP5=010573
47START=004024	LINES	ORDSWITCHES=010612
47TABLE=004127	LIST	ORDSTARTW=004323
47TSD=004113	LPLOST	ORDSTARTB=004317
*76BUT=011417	LSP	ORDSTART=010121
*76TABLE=011420	-LTAKE	ORDWORST
AFFB	MACAPX=004653	ORDWA3=010617
ALLREAD=004277	MACAPT=004632	ORDWA1=010615
ATATAP	MACAPL004603	ORDWA2=010616
ATBITS	MACAP1=004652	ORDWORST1=010605
ATCIRCLE	MACAPTX=004647	ORIGIN
ATINS	MACAPA=004634	*PAGE1=011436
ATLINE	-MAKA	PAGE1D=004157
ATPOINT	MAKETEXT=004654	PAGE1E=004201
BLOCKMAKER=010025	MAKESCALER=004702	PAGE1F=004237
BLOCKMAKEREX=010075	MAKECONS=004745	PAGE1G=004260
BLOCKM2=010070	MAKETEXTX=004701	PATAP
BLOCKM1=010063	MAKESCALERX=004744	PBOCC
BWHOS	MAKECONSX=004777	PBOCS
*CCENT=011422	MAKECONS1=004761	PBOCP
CEP	MAKPATA=005374	PBOLE
CHVAR	MAKPATAX=005417	PBOLS
CIRCEN	MASBL	PBOLP
CIRCLES	MASTERS	PICBLKS
CL=011007	MATD	PICOUT=004374
-COMBL	MATH	PICOUTGRX=004414
-COMBR	MATO	PICOUT1=004415
COMP	MATRX	PICOUTX=004434
CONAP=004601	MATRY	PICOUT0=004422
CONLET	MATS	PICOUT2=004417
CONSTRAINTS	MERGERS	PICOUT3=004427
CONSTOUT=004327	MERGER=006314	PICOUT01=004433
CONSTOUTX=004346	MERGEIFP=006020	PICTURES
CONSTOUT1=004347	MERGEIFPX=006037	PICTUREK
CONSOUTSUB=004366	MERGEIFP1=006034	PINS
CONSOUTSUBX=004373	MERGEX=006632	PLS
COPIED=007456	MERGERBAC=006320	PNAME
*COPYNUM=011421	MERGERB=006341	POINTS
COPYIST=007170	MERGERC=006343	POINTSOUT=004440
COPYINT=007166	MERGERD=006346	POINTSOUTGRX=004457
COPYMOVE=007437	*MERGTS=011432	POINTSOUT1=004460
COPYITA=007234	MERGERA=006360	POINTSOUTX=004476

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IES 2XMX 002

COPYX=007574	META	PPART
COPY1=007214	MGP1=010710	PPARTM
COPY1X=007220	MGP2=010731	PSAVE
COPY1T=007221	MGP2X=010741	PSIZE
.COPYPIC=011423	MGP3=010757	PSPL
COPYOUP=007267	MGPCURPIC=010776	PTSOUT1=004477
COPYFLS=007323	MGPC=010777	PTSOUT1X=004503
COPYDUPX=007322	MGPEXIT=010642	PTSOUT2=004527
COPYFIX=007356	MGPERROR=011002	PTSOUT1I=004526
COPYFIXEX=007377	MGPK=010737	PTSOUT1A=004515
COPYFIXT=007374	MGPLAST INSTR=011005	PTSOUT1B=004522
COPYFIXI=007454	MGPMOVP=010643	←PUT
COPYFIXA=007414	MGPMOVPX=010707	←PUTL
COPYFIXB=007424	MGPMOVP1=010664	←PUTLQ
COPYFIXC=007434	MGPMGP=010705	←PUTR
COPYNOMOVE=007572	MGPMOVP1X=010670	←PUTRQ
COPYMOVE1=007472	MGPSTART=010623	←PUTSUB
COPYMOVE2=007530	MGPSW=010732	PVAL
COPYMOVE1P=007512	MGPVAL=011000	PWHOS
COPYMOVE1A=007523	MKCN1X=005004	PYTHAGORIAN
COPYMOVE2A=007547	MKCN1=005000	RDTX2
COPYMOVE2AX=007571	MKCN3=005053	READIT=004147
CPNAME	MKCN2X=005052	READITEX=004300
CPY1=004301	MKCN2=005020	RI=011006
CPY1X=004316	.MKCN2A=011430	RIBMN
CPY1T=004314	.MKCN2B=011431	RIBM
CPY2=004304	MOVED	S
CPY3=004307	←MOVE	SCALERS
CPY4=004312	←MOVEB	SCCEN
CSP	←MOVEL	SCSZ
CSQ	←MOVER	SHAFTUSE
CURPICS	MOVEPOINT=005575	SIZE
CVAL	MOVEPIC=005056	SMASBL
CVTS	MOVE°=005610	SPECB
DEADS	MOVEPICEX=005070	SSHOW
DEL1=007643	MOVETHISX=005123	ST=011010
DEL2X=007671	MOVETHIS=005106	←STAB
DEL2=007653	MOVEPOINTEX=005607	←STAE
DEL3=007657	MOVE°X=005655	START76
DEL4=007672	MOVE°C=005622	STARTS=004007
DEL5=007711	MOVE°T=005625	STARTDRAW=005455
DELETE=007622	MOVE°V=005652	STARTDRAWEX=005553
DELETEX=007724	MOVE°CT=005631	STARTL=005536
DELETER=007623	MOVE°CT1=005640	STARTC=005473
DESIGNATED	MOVE°D=005654	STARTCA=005517
DESIGS	MOVE°VSS=005656	STARTT=005531
DESIGNATE=005554	MOVE°MVG=006002	STOPMOVEP=006040
DESIGIT=005322	MOVE°VSSX=005662	STOPMOVEX=006127
DESIGNATEND=005574	MOVE°VS=005717	STOPMOVEP1=006130
.DESTS=011424	MOVE°I1=005707	STOPM1=006217

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*   IES   2XMX   003

DISPLAYK	MOVE=VSX=005764	STOPTAKE=006206
DISPLAY	MOVE=V1=005745	STOPMOVEPB=006073
DUM1=006702	MOVE=V2=005750	STOPMOVEPA=006111
DUM2=006707	MOVE=IPM=005765	STOPMOVEP1X=006146
DUM3=006722	MOVE=IPMX=006001	STOPMOVEP2=006147
DUM4=006740	MOVE=MVGX=006017	STOPMOVEP2X=006205
DUM4X=006744	MOVINGDONE	STOPMOVEP2J=006160
DUM5=006770	MOVIT	STOPMOVEP2D=006173
DUM6=006774	MOVINGS	STOPM1X=006223
DUM7=007027	MPBOC=004533	STOPM2=006224
DUM8=007061	MPBOCX=004555	STOPM3T=006260
DUM8X=007065	MPBOL=004556	STOPM3=006243
DUMMY=006633	MPBOLX=004600	STOPM4=006313
DUMMEX=007060	MRGRFTT	STOPM3X=006250
DUMMYA=006657	*MRGRU=011427	STOPM3L=006255
DUMMYB=006664	MRGR9=006631	STOPM3C=006251
DUMMYAX=006663	*MRGRL=011433	STOPM3AI=006310
ERASE=007575	MRGRX=006504	STOPM3A=006265
ERASEX=007621	MRGR1=006367	*STOPM3S=011441
ERASE1=007612	MRGR4=006443	STOPM3AL=006275
ERASEA=007603	MRGR2=006404	STOPM3AC=006300
ERASE2=007616	MRGR3=006414	STOPM3AT=006302
ERRORSTOP	MRGR6=006547	SUBPIC=005134
-ERROR	MRGR3A=006424	SUBPICEX=005272
-ERROR1	MRGR5=006456	SUBPIC2=005140
FIXEDS	*MRGRTS=011435	SUBPIC1=005135
FIXIT=005276	MRGR5A=006460	SUBPIC3=005147
FIXITEX=005321	MRGR5B=006467	SUBPICS=005201
FREES	MRGRXA=006626	SUBPICR=005174
FREEDOMS	MRGR7=006505	SUBPIT=005241
FRESH START=004000	MRGR8=006507	SUBPIT1=005271
GARBAGE=007725	MRGR10=006525	SUBPITX=005245
GARBEX=010034	MRGR6A=006611	-SUBR
GARB1=007734	*MRGTP=011434	*SUBR1
GARB2=007743	MTDIS=005071	SVAL
GARB3=007746	NAFFB	SWITCH
GARB4=007755	NAME	*SWITCH1=011437
GARB4A=007756	NCON	*SWITCH2=011440
GARBDONE=010033	NEWCONS	T
GARBS=010022	NEWCONTOG	*T1
*GARBA=011425	NINAME=005273	*T2
*GARBB=011426	NIRR=005274	TEXTS
GARB5=010006	NITOG	TOL
GARB5A=007773	NLIST	TOPOS
GARB6=010024	NTOSHO	TPVAL
GARB7=010007	NUMBERS	TPVALS
GETBLOCKER=010076	NVAL	TRUEUP=005430
GETBLOCKEX=010120	ONCIRCLES	TRUEUPX=005454
GETBLOCK1=010105	ONLINES	TRUEUP1=005443
GETIT	ORDC2	TUPLE

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    *               IES   2XMX    004

 *GORR              ORDCALCEXIT=010277     TVAL
 *GORREXIT          ORDCURPIC=010142       TXTS
  HOLDERS           ORDCALC=010241         TYPE
  HOVCODE           ORDC0=010245           UNFIX=005325
  HOVP2             ORDC1=010267           UNFIXEX=005362
  HOVP1             ORDC1A=010274          UNFIX1=005363
  HOVS              ORDCIRCLES=010463      UNMAC=007077
  HOWBIG            ORDCIRC1=010474        UNMACEX=007165
  I2=200002         ORDCIRC2=010522        UNMAC1=007112
  IS2=200052        ORDCIRC3=010532        UNMAC2=007122
  IBVCODE           ORDEXIT=010330         UNMAC3=007140
  IBVERTS           ORDERROR=010607        UNMAC4=007161
  IBVW              ORDGREXIT=010141       UNMAC3X=007144
  INSTANCES         ORDGRPI=010166         VA
  IP                ORDGRPIEXIT=010174     VARIABLES
  IPC1              ORDGRPI1=010207        VARLOC
  IPCONS            ORDGRPP=010327         VCON
  IPCOTP            ORDGRPP1=010350        VFLW
  IPCP              ORDISW                 VORD
  IPCV              ORDI=010211            WHERE
  ISIZE             ORDI2=010213           WIBM
  IVAL              ORDLAST=010622         WIBMN
  IWHAT             ORDMIND=010620         WORKS
  JUNKK             ORDMOVEL=010313       *ZZLAST=011442
  KEYSTART          ORDMOVELEXIT=010326    Y
  KIND              ORDMP=010537           x1
  LAST=011011       ORDMPSW=010553         x2
 *LDAB              ORDNXTPNT=010621       α
 *LDAE              ORDPX=010613           Δ
  LEP               ORDPY=010614           ε
                                           β
                                           λ
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              IES  2XMX   008
 .
ATPOINT=SKM 3.2 200044                       = 1762200044
ATLINE=SKM 3.3 200044                        = 1763200044
ATCIRCLE=SKM 3.4 200044                      = 1764200044
AFFB= LIST                                   =      24000
ATBITS= 200044                               =     200044
ATINS=SKM 3.8 ATBITS                         = 1770200044
ATATAP= 2    ..ATTACHER THING                =          2

BWHOS= 4     ..TO WHICH PICTURE BLOCK BELONGS
                                             =          4


CVAL= 16     .. CIRCLE ANGLE AND RADIUS      =         16
CSQ=RFD 2+1                                 =301200200004
CIRCEN= 14  .. CIRCLE CENTER                 =         14
CSP= 10      .. CIRCLE START POINT           =         10
CEP= 12      .. CIRCLE END POINT             =         12
CIRCLES= 2.MASBL+PICTURES                    =      24225
CVTS= 6      .. VARIABLE TO MOVE TO SATISFY THIS
                                             =          6
CPNAME= 200054                               =     200054
COMP= 16     ..CONSTRAINT COMPUTATION ROUTINE
                                             =         16
CHVAR= 20    ..# CHA[illegible]              =         20
CURPICS= [illegible]                         =      24117
CONSTRAINTS= [illegible]+LIST+1                     [illegible]
CONLET= 12  ..CONSTRAINT LETTER [illegible]


DESIGNATED=SKM 4.10 PAGE1                    =
DEADS= 11.SMASBL+LIST+1                      =
DISPLAYK= 2                                  =
DISPLAY= 5   ..MASTER DISPLAY SUBROUTINE =
DESIGS= 13.SMASBL+LIST+1                     =      24103

ERRORSTOP=SKM 4.10 377730                    = 1712377730

FREES= 5.SMASBL+LIST+1                       =      24037
FREEDOMS= 6.SMASBL+LIST+1                    =      24045
FIXEDS= 12.SMASBL+LIST+1                     =      24075

GETIT= 7     ..MASTER FORMATION SUBROUTINE
                                             =          7
.GORREXIT= MGPERROR                          =      11002

HOVP2= 12    .. SECOND HORIZ OR VERT POINT
                                             =         12
HOVP1= 10    .. FIRST HORIZ OR VERT POINT
                                             =         10
HOVCODE= 14 .. HORIZ=1. VERTICAL=2. EITHER=0
                                             =         14
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              IES    2XMX    006

MOVS= 15*MASBL+PICTURES                             =       24561
MOWBIG= 6     **MASTER SCSZ COMPUTATION             =           6
HOLDERS= 2*SMASBL+LIST+1                            =       24015

IWHAT= 14     ** WHAT PIC THIS IS INSTANCE OF
                                                    =          14
INSTANCES= 6*MASBL+PICTURES                         =       24345
ISIZE= 16     ** R                                  =          16
IPCONS= 11*MASBL+PICTURES                           =       24441
IPCP= 10      **POINT IN INSTANCE-POINT CONSTRAINT
                                                    =          10
IPCI= 12      ** INSTANCE IN INSTANCE-POINT CONSTRAIN
                        T                           =          12
IPCV= 14      ** VIRGIN POINT IN INSTANCE-POINT CONST
                        RAINT                       =          14
IPCOTP= 16    ** INSTANCE-POINT CONSTRAINTS WITH THIS
                        VIRGIN                      =          16
IBVERTS= 14*MASBL+PICTURES                          =       24535
IBVW= 10      ** WHICH INSTANCE IS VERTICAL
                                                    =          10

IP= LIST+IVAL+2                                     =       24022
IVAL= 20      ** R COS *, R SIN *, X, Y             =          20
IBVCODE= 12 ** INSTANCE TO BE VERTICAL, HORIZ, ETC
                                                    =          12


JUNKK= 3                                            =           3


KIND= 13      **1=NOT IN PIC, 2=PPART, 3=PICBLKS
                                                    =          13

KEYSTART= 200076                                    =      200076


LIST= 24000 **LIST STRUCTURE START                  =       24000
LSP= 10       **START OF LINE                       =          10
LEP= 12       **END OF LINE                         =          12
LPLOST=SKM 4,10 200042                              =  1712200042
LINES= 1*MASBL+PICTURES                             =       24201
*LGORR1=                                            =           6
*LGORR0=                                            =           2
*LGORREND=                                          =          14
*LGORR2=                                            =          13


MASBL= 24     **MASTER BLOCK LENGTH                 =          24
MOVED=SKM 4,10 SCSZ                                 =  1712200034
MOVINGDONE=SKM 4,10 200061                          =  1712200061
MASTERS= LIST+1                                     =       24001
MERGERS= 10*SMASBL+LIST+1                           =       24061
META= 12                                            =          12
MATM= MATS+1            **MAIN DIAG OF TRANSFORMATION
                                                    =      200071

MATS= 200070            **TRANSFORMATION SIZE =            200070
```

11.5

```
-----------------------------------------------------------------------

                IES   2XMX   007
 .
MATD= MATS+5          **DENOMINATOR OF TRANSFORMATION
                                                  =      200075

MATRX= MATS+1         **X TRANSLATION OF TRANSFORMATIO
                             N                    =      200071

MATO= MATS+2          **OFF DIAG OF TRANSFORMATION
                                                  =      200072

MATRY= MATS+4         **Y TRANSLATION OF TRANSFORMATIO
                             N                    =      200074

MOVIT= 10    **HOW TO MOVE COORDINATES            =          10

MOVINGS= 14=SMASBL+LIST+1                         =       24111

MRGRFTT=SKM 4,10 MRGRU                            =  1712011427


NITOG= 377725                                     =      377725

NUMBERS= 10=MASBL+PICTURES                        =       24415

NAFFB= NLIST                                      =       22000

NLIST= 22000                                      =       22000

NTOSHO= 14   ** SCALER TO BE SHOWN                =          14

NVAL= 16     ** R COS ø, R SIN ø, X, Y            =          16

NCON= 17     **# CONSTRAINTS SHOWN                =          17

NEWCONS= 16=SMASBL+LIST+1                         =       24125

NAME= 4      **NAME OF HEADER BLOCKS              =           4

NEWCONTOG= 377725                                 =      377725


ONCIRCLES= 13=MASBL+PICTURES                      =       24511

ORIGIN= 4000                                      =        4000

ONLINES= 12=MASBL+PICTURES                        =       24465

ORDISW=SKM 1,1 ORDSWITCHES                        =  1721010612

ORDWORST=SKM 4,10 ORDSTARTW                       =  1712004323

ORDC2= ORDCALCEXIT                                =       10277


PICTURES= 22=SMASBL+LIST+1                        =       24155

PLS= 14      ** LINES ND CIRCLES ON THIS POINT
                                                  =          14

PVAL= 20     ** COORDINATES OF POINT              =          20

POINTS= 4=MASBL+PICTURES                          =       24275

PSPL= 200042                                      =      200042

PNAME= 17    **NAME OF PICTURE, 36 BITS           =          17

PSIZE= 16    **SIZE OF THIS PICTURE               =          16

PPART= 4     **PICTURE PARTS                      =           4

PINS= 14     **INSTANCES OF THIS PICTURE          =          14

PATAP= 12    **ATTACHERS OF THIS PICTURE          =          12

PPARTM= 10   **MOVING PICTURE PARTS               =          10

PBOLE= 10    ** END POINT OF LINE                 =          10

PBOLS= 12    ** START OF POINT ON LINE            =          12

PBOCC= 10    ** CENTER OF POINT ON CIRCLE
                                                  =          10

PBOCS= 12    ** START OF POINT ON CIRCLE          =          12

PBOCP= 14    ** POINT TO BE ON CIRCLE             =          14

PBOLP= 14    ** POINT TO BE ON LINE               =          14

PSAVE= 20    **# REGISTERS TO SAVE IN PICTURE
```

```
-----------------------------------------------------------

                 IES   2XMX   010

PICBLKS= 2   **NON PICTURE  STUFF  IN  PICTURE
                                                  =        2
PICTUREK= 1                                       =        1
PYTHAGORIAN= 200007                               =   200007
PWHOS= 6      **PICTURE  IN  PICTURES             =        6

RIBMN= 200121                                     =   200121
RIBM= 200120                                      =   200120
ROTX2= 126                                        =      126

SMASBL= 6     **SMALL MASTER  BLOCK  LENGTH  FOR  DESIGNA
                               TERS               =        6
SCSZ= 200034                                      =   200034
SCCEN= 200035                                     =   200035
S= 7                                              =        7
START76= 200067                                   =   200067
SWITCH= 377621                                    =   377621
SIZE= 11      **SIZE  OF  BLOCK                   =       11
SCALERS= 3*MASBL+PICTURES                         =    24351
SPECB= 2      **SPECIFIC  BLOCKS                  =        2
SSHOW= 14     ** NUMBERS  SHOWING  THIS  SCALER
                                                  =       14
SVAL= 16      ** VALUE OF SCALER                  =       16
SHAFTUSE=SKM  4·10  200055                        = 1712200055
.SUBR1=                                           =       10

TYPE= 0       **TIES  TO  SPECB  IN  MASTER  BLOCK
                                                  =        0
T= 10                                             =       10
TEXTS= 7*MASBL+PICTURES                           =    24371
TVAL= 14      ** R COS a, R  SIN a, X, Y          =       14
TXTS= 20      ** POINTER  TO  TEXT  SHOWN         =       20
TUPLE= 14     **# VARIABLES                       =       14
TOL= 2000                                         =     2000
TPVAL= 14     **X,Y  LOCATION                     =       14
TPVALS= 5*MASBL+PICTURES **TYPICAL  VARIABLES
                                                  =    24321
TOPOS= 3*SMASBL+LIST+1                            =    24023
.T1= 0                                            =        0
.T2= 21                                           =       21

VCON= 12      ** CONSTRAINTS  ON  THIS  VARIABLE
                                                  =       12
VFLW= 10      ** CONSTRAINTS  WHICH  THIS  VARIABLE  IS  T
                         O  SATISFY               =       10
VORD= 6       **ORDERING  OF  VARIABLES           =        6
VA= LIST+PVAL                                     =    24020
VARLOC= 15  **LOCATION  OF  VARIABLES  IN  BLOCK
                                                  =       15
VARIABLES= 1*SMASBL+LIST+1                        =    24007
```

```
-----------------------------------------------

            IES   2XMX   011

WORKS= 7+SMASBL+LIST+1                 =      24053
WIBM= 200122                           =     200122
WIBMN= 200123                          =     200123
WHERE= 12    ..LOCATION OF THING IN PICTURE
                                       =         12

Y= 3                                   =          3

[illegible]1= 11                       =         11
[illegible]2= 12                       =         12

[illegible]= 1                         =          1

[illegible]= 4                         =          4

[illegible]= 5                         =          5

B= 2                                   =          2

[illegible]= 6                         =          6
```

```
---------------------------------------------

                    IES   ,XMX    ,1,
          .
--DEF  MOVE|A→B
.LDE A
STE B
--END

--DEF  ,□A,B,C,D,E,F,G,H,I,.
REX8,(0,)
RSX8,(LIST+I8)+(I^(370,))
RSX8,(LIST+H8)+(H^(370,))
RSX8,(LIST+G8)+(G^(370,))
RSX8,(LIST+F8)+(F^(370,))
RSX8,(LIST+E8)+(E^(370,))
RSX8,(LIST+D8)+(D^(370,))
RSX8,(LIST+C8)+(C^(370,))
RSX8,(LIST+B8)+(B^(370,))
RSX8,(LIST+A8)+(A^(370,))
--END

--DEF  MOVEB|A,B→C,D
T1 ,A
T2 ,C
SKN T1,B
SUZ T2,D
MKN T2,D
--END

--DEF  CORR,A,,,8→B→C
DPX,T2+1
RSX,|,LIST+A+1
JPG T1
T1→     .LDE,LIST-1
'SED (0)
JPG T2+2
RSX,|,LIST
.JPG B
T2→     1'RSX8|,LIST-1
JNX8,*+2
REX8,
INX8|,
DEX8,1
T2→     JPG T1
.
RSX,*-1
JPG C
--END

--DEF  ERROR,,→P
.JPG (ERROR1,,→P)
--END
```

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

                    IES   ‡XMX   011

--DEF  ERROR1‡0→P
'STE ‡+1
SKZ ERRORSTOP
'‡0
JPG P
--END

--DEF  MAKA‡A→I
REX0A-LIST
‡JPG BLOCKMAKER
REXI|A
--END

--DEF  LDAB‡P
LDA P
LDB P+1
--END

--DEF  STAB‡P
STA P
STB P+1
--END

--DEF  LTAKE‡N‡XR
''RSXS|XRLIST+(N)+1
''RSXT|XRLIST+(N)+1
'DPXT|SLIST
'EXXS|TLIST
'DPXS|XRLIST+(N)+1
'DPXS|XRLIST+(N)+1
'DPX0|XRLIST+(N)
--END

--DEF  PUTL‡N‡XR→M‡XR1
''AUXXR((N)+1..-((N)+1))
''RSXS|XR1LIST+(M)+1
'DPXS|XRLIST
''RSXT|SLIST
'DPXT|XRLIST
        'DPXXR|TLIST
        'DPXXR|SLIST
''RSXS|XR1LIST+(M)
‡JPXS‡+1
SKXS|XR1,0
'DPXS|XRLIST-1
''AUXXR((N)+1..-((N)+1))
--END

--DEF  PUTLG‡N‡XR→M‡XR1
''RSXS|XRLIST+(N)+1
```

```
--------------------------------------------------------

            IES    ,XMX    ,14

'EXXS|XR,LIST+(M)+1
'DPXS|XRLIST+(N)+1
''RSXJ|SLIST
'EXXT|XRLIST+(N)+1
'DPXT|SLIST
''RSXS|XR,LIST+(M)
,JPXS,+1
SKXS|XR,0
'DPXS|XRLIST+(N)
--END

--DEF  MOVEL,N,XR→M,XR,
''RSXS|XRLIST+(N)+1 ,, TAKE
''RSXT|XRLIST+(N)+1
'DPXT|SLIST
'EXXS|TLIST
'DPXS|XRLIST+(N)+1
'EXXS|XR,LIST+(M)+1 ,, PUT
'DPXS|XRLIST+(N)+1
''RSXT|SLIST
'EXXT|XRLIST+(N)+1
'DPXT|SLIST
--END

--DEF  PUTR,N,XR→M,XR,
''AUXXR{(N)+1..-((N)+1)}
''RSXS|XR,LIST+(M)+1
'DPXS|XRLIST
''RSXT|SLIST
'DPXT|XRLIST
      'DPXXR|SLIST
      'DPXXR|TLIST
''RSXS|XR,LIST+(M)
,JPXS,+1
SKXS|XR,0
'DPXS|XRLIST-1
''AUXXR{(N)+1..-((N)+1)}
--END

--DEF  PUTRQ,N,XR→M,XR,
''RSXS|XRLIST+(N)+1
'EXXS|XR,LIST+(M)+1
'DPXS|XRLIST+(N)+1
''RSXT|SLIST
'EXXT|XRLIST+(N)+1
'DPXT|SLIST
''RSXS|XR,LIST+(M)
,JPXS,+1
SKXS|XR,0
'DPXS|XRLIST+(N)
```

```
------------------------------------------
                IES   XMX   ..
--END

--DEF  MOVER N XR-M XR
''RSXS IXRLIST+ (N)+ .. TAKE
''RSXT IXRLIST+ (N)+
'DPXT ISLIST
'EXXS ITLIST
'DPXS IXRLIST+ (N)+
'EXXS IXR LIST+ (M)+ .. PUT
'DPXS IXRLIST+ (N)+
''RSXT ISLIST
'EXXT IXRLIST+ (N)+
'DPXT ISLIST
--END

--DEF  COMBL N XR-M XR
''RSXS IXRLIST+ (N)+
'EXXS IXR LIST+ (M)+
''RSXT IXRLIST+ (N)+
'DPXS ITLIST
'EXXT ISLIST
''RSXS IXRLIST+ (N)+
'EXXT ISLIST
'DPXT IXRLIST+ (N)+
'DPXT IXRLIST+ (N)+
--END

--DEF  COMBR N XR-M XR
''RSXS IXRLIST+ (N)+
'EXXS IXR LIST+ (M)+
''RSXT IXRLIST+ (N)+
'DPXS ITLIST
'EXXT ISLIST
''RSXS IXRLIST+ (N)+
'EXXT ISLIST
'DPXT IXRLIST+ (N)+
'DPXT IXRLIST+ (N)+
--END

--DEF  LCORR N XR XR -SUBR-LEXIT
CORREXIT=LEXIT
'DPX XRLCORR
''RSX XR IXRLIST+ (N)+
LCORR -         ''RSX XR IXR LIST-
 -'JNX XR + 
'SXX XR
INX XR IXR
LCORR -         SXD XR .. MODIFIED
.JPO CORREXIT+ (CORREXIT/CORREXIT) .(LCORREND+)
''RSX XR IXR LIST
```

```
-----------------------------------------------------------

              IES   ;XMX    0;6

'DPXXR,LGORR;
;JPQ SUBR
LGORR;→        SKXXR,#          **MODIFIED
LGORREND→      JPQ LGORRo
--END

--DEF  LGORL;N*XR=XR;→SUBR→LEXIT
GORLEXIT=LEXIT
'DPXXRLGORL;
''RSXXR;IXRLIST+(N)+;
LGORLo→        '6RSXXRIXR,LIST-;
;-'JNXXR#+;
'SKXXR'
INXXRIXR;°
LGORL;→        SXDXR# **MODIFIED
;JPQ GORLEXIT+(GORLEXIT/GORLEXIT©);*(LGORLEND+;))
''RSXXR;IXR;LIST
'DPXXR,LGORL;
;JPQ SUBR
LGORL;→        SKXXR,#          **MODIFIED
LGORLEND→      JPQ LGORLo
--END

--DEF  LGORRI;N*XR=XR;→SUBR→LEXIT
GORRIEXIT=LEXIT
'DPXXRLGORRI;
''RSXXR;IXRLIST+(N)+;
LGORRIo→       '6RSXXRIXR,LIST-;
;-'JNXXR#+;
'SKXXR'
INXXRIXR;°
LGORRI;→       SXDXR# **MODIFIED
;JPQ GGORRIEXIT+(GORRIEXIT/GORRIEXIT©);*(LGORRIEND+;)
                          '
'DPXXR,LGORRI;
''RSXXR;IXR,LIST     **CURRENT NEXT
;JPQ SUBR
LGORRI;→       SKXXR,#          **MODIFIED
''RSXXR;IXR,LIST     **NEW NXT
LGORRIEND→     JPQ LGORRIo
--END

--DEF  LGORLI;N*XR=XR;→SUBR→LEXIT
GORLIEXIT=LEXIT
'DPXXRLGORLI;
''RSXXR;IXRLIST+(N)+;
LGORLIo→       '6RSXXRIXR,LIST-;
;-'JNXXR#+;
'SKXXR'
INXXRIXR;°
```

```
--------------------------------------------------
             IES    ,XMX    ,1'
LGORLI1-     SXD XR' ,,MODIFIED
,JPG GORLIEXIT+(GORLIEXIT/GORLIEXIT©1,(LGORLIEND+1))

'DPX XR,LGORLI2
''RSX XR,IXR,LIST      ,,CURRENT NXT
,JPG SUBR
LGORLI2-       SKX XR,'          ,,MODIFIED
''RSX XR,IXR,LIST      ,,NEW NXT
LGORLIEND-     JPG LGORLI,
--END

--DEF   SUBR,A
        'STE SUBR1
        A
SUBR1- JPG '
--END

--DEF   LDAE,P
        LDA P
        LDB P+1
        LDC P+2
        LDD P+3
--END

--DEF   STAE,P
        STA P
        STB P+1
        STC P+2
        STD P+3
--END

--DEF   PUT|A.'-B.'
        REX,1|,A+1
        ''RSX,2|,B+1+LIST
        ,JPG (PUTSUB)
        'DPX,|,LIST+A
--END

--DEF   PUTSUB
        'STE '+'
        'DPX,2|,1,LIST
        ''RSX T|,2,LIST
        'DPX T|,1,LIST
        'DPX,1|T,LIST
        'DPX,1|,2,LIST
        JPG '
--END
```

```
---------------------------------------------------------

              IES   1XMX    020

 200002|
I2-     JPQ  FRESH START          |140500 004000|    002
        JPQ  STARTS               |140500 004007|    003
 200050|
        JPQ  47FIXL               |140500 004025|200050
        JPQ  47LOSTPEN            |140500 004122|    051
IS2-    *JMP  BLOCKMAKER          |400500 010035|    052
        *JMP  GETBLOCKER          |400500 010076|    053
 200066|
        *JMP  READIT              |400500 004147|    066
 ORIGIN|
FRESH START-
         CSQ40                    |301240 004001|004000
        MOVEINAFFB-AFFB
        *LDE  NAFFB               |402000 022000|    001
        STE   AFFB                |003000 024000|    002
        RSX 0 AFFB                |001101 024000|    003
        LDA 0 NLIST               |002401 022000|    004
        STA 0 LIST                |003401 024000|    005
        -1JPX 0*-1                |760601 004004|    006
```

BWILD

RDTX2=200126

```
            IES   2XNX   001
STARTS→RXF 47  47START
       DPX  ATBITS
       MKZ  MOVINGDONE
       DPX  0
       DPX  1
       DPX  2
       DPX  47TABLE
       RXF  54 *200040
       RXF  65  KEYSTART
       RXF  76  START76
       MKZ  MOVED
       MKZ  DESIGNATED
       JPD  #
47START→
        CSQ47
47FIXL→DPX  PAGE1
       *RSX 47  ATBITS
       SXD  47  1
       JPQ  #+2
       JPQ  47LITEIT
       2DPX 0  PAGE1
       RSX  0  ATBITS+1
       RSX  0|0  LIST+TYPE
       SXD  0  LINES-LIST
       MKN  1·6  PAGE1
       SXD  0  CIRCLES-LIST
       MKN  1·6  PAGE1
       SXD  0  SCALERS-LIST
       MKN  1·8  PAGE1
47FIXL1→
       SXD  0  POINTS-LIST
       MKN  1·5  PAGE1
       SXD  0  TPVALS-LIST
       MKN  1·3  PAGE1
       SXD  0  INSTANCES-LIST
       MKN  1·4  PAGE1
       SXD  0  TEXTS-LIST
       MKN  1·8  PAGE1
       SXD  0  NUMBERS-LIST
       MKN  1·8  PAGE1
       RSX  0|0  LIST+TYPE
       SXD  0  CONSTRAINTS-LIST
       MKN  1·2  PAGE1
       RSX  0  ATBITS+1
       RSX  0|0  LIST+ATATAP
       SXD  0  0
       JPQ  #+2
       MKN  1·1  PAGE1
       RSX  0  ATBITS+1
       RSX  0|0  LIST+VORD
```

```
         SXO . FIXEDS-LIST
         MKN ,.7 PAGE1
         ,RSX . PAGE1
47LITEIT→
         MOVEB*DESIGNATED→22*PAGE1
         *LDE   PAGE1
         'STE   47LITE1
47LITE1→         .
         'IOS 75 30777
47EIR→   *LDE   SWITCH
         *STE   SWITCH1
         SED   SWITCH2
         JPQ,  47TSD
         *COM   SWITCH2        **GET ALL NEW
         *ITE   SWITCH1        **ONES INTO 47BUT
         STE   47BUT
         MOVE|SWITCH1→SWITCH2
         *LDE   47BUT
         SED  ( . )
47TSD→   JPD  .
47BOTH→ *RSX 47 47TABLE
         *LDE   47BUT
         *STE 47 47TABLE+1
         *INX 47 1
         DPX 47 47TABLE
         JPQ   47TSD
47LOSTPEN→
         SKZ 4.9 SWITCH        **HOLD
         JPQ   47TSD
         MOVE|( 40)→47BUT
         JPQ   47BOTH
47TABLE→
         .
 47TABLE+20|
READIT→'STE   READITEX
         REX . .
         *SXL .*47TABLE
         *JPQ   ALLREAD
         LDA . 47TABLE+1
         STA   76BUT
         INX . 1
         DPX . 76TABLE
PAGE1D→ SKZ 1.6 76BUT ← [struck out] 2.1
         *JPQ   STOPMOVEP
         SKZ 1.8 76BUT
         *JPQ   STARTDRAW
         SKZ 1.7 76BUT
         *JPQ   DESIGNATE
         SKZ 1.3 76BUT
         *JPQ   ERASE
```

```
                IES  2XMX  003
        SKZ 2.1  76BUT      <- 1.6
        *JPQ  MOVEPOINT
        SKZ 3.2  76BUT
        *JPQ  MAKETEXT
        SKZ 3.7  76BUT
        *JPQ  MAKESCALER
        SKZ 4.1  76BUT
        *JPQ  MGPSTART
        SKZ 2.8  76BUT      <- 1.1
        *JPQ  MAKECONS
PAGE:E- SKZ 2.9  76BUT      <- 1.2
        *JPQ  TRUEUP
        SKZ 2.6  76BUT      <- 1.4
        *JPQ  MAKPATA
        SKZ 2.4  76BUT      <- 1.5
        *JPQ  SUBPIC
        SKZ 2.3  76BUT
        *JPQ  DUMMY
        SKZ 1.9  76BUT
        *JPQ  CPY1
        SKZ 2.5  76BUT
        *JPQ  CPY2
        SKZ 3.1  76BUT
        *JPQ  CPY3
        SKZ 3.6  76BUT
        *JPQ  CPY4
        SKZ 2.2  76BUT
        *JPQ  DESIGIT
        SKZ 2.7  76BUT
        *JPQ  UNFIX
        SKZ 3.3  76BUT
        *JPQ  FIXIT
        SKZ 4.4  76BUT
        *JPQ  UNMAC
        SKZ 1.1  76BUT      <- 2.8
        *JPQ  MOVEPIC
        SKZ 4.6  76BUT
        *JPQ  ORDSTARTB        **BEST
        SKZ 4.5  76BUT
        *JPQ  ORDSTARTW        **WORST
PAGE:F- SKN 4.10 SWITCH        **IF ONE, DO DEADLY DELETI
                               ONS
        JPQ   PAGE:G
        SKZ 1.2  76BUT
        *JPQ  CONSTOUT
        SKZ 1.4  76BUT
        *JPQ  POINTSOUT
        SKZ 1.5  76BUT
        *JPQ  PICOUT
        SKN 4.3  76BUT
```

FOR MOVIE

COPY 1.9
DRAW 1.8
CENTER 1.7
MOVE 1.6
INST 1.5
TIE 1.4
DEL 1.3
HORV 1.2
CONS 1.1

24

```
                    IES   2XMX   004
          JPQ  #+7
          *JPQ  GARBAGE
          SKZ  4.2  SWITCH
          JPQ  #+3
          *JPQ  WIBM
          JPQ  #+2
          *JPQ  WIBMN
          JPQ  ALLREAD-2 .
  PAGE1G- SKN  4.3  76BUT
          JPQ  #+10
          SKN  4.2  SWITCH
          JPQ  #+3
          *JPQ  RIBMN
          JPQ  #+2
          *JPQ  RIBM
          *JPQ  GARBAGE
          MKN  MOVED
          SKN  3.9  76BUT
          JPQ  #+3
          *JPQ  RDTX2
          MKN  MOVED
          RSX  0  76TABLE
          JPQ  READIT+2
 ALLREAD-
          *DPX  47TABLE
 READITEX-
          JPQ  #
 CPY1-    'STE  CPY1X
          LDA  777723
          JPQ  CPY1T
 CPY2-    'STE  CPY1X
          LDA  777722
          JPQ  CPY1T
 CPY3-    'STE  CPY1X
          LDA  777721
          JPQ  CPY1T
 CPY4-    'STE  CPY1X
          LDA  777720
CPY1T-    STA  COPYNUM
          *JPQ  COPYIST
CPY1X-    JPQ  #
ORDSTARTB-
          'STE  #+3
          MKZ  ORDWORST
          *JPQ  ORDSTART
          JPQ  #
ORDSTARTW-
          'STE  #+3
          MKN  ORDWORST
          *JPQ  ORDSTART
```

```
      JPO *
 CONSTOUT-
      'STE  CONSTOUTX
      REX , CURPICS-LIST
      LGORR=SPECB*0=S-CONSTOUT1
 CONSTOUTX-
      JPO *
 CONSTOUT1-
      SUBR=(LGORR=PICBLKS*0=S-CONSOUTSUB)
 CONSOUTSUB-
      'STE  CONSOUTSUBX
      RSX ,1, LIST+TYPE
      RSX ,1, LIST+TYPE
      SXD , CONSTRAINTS-LIST
      *JPO  DELETE
 CONSOUTSUBX-
      JPO *
 PICOUT-'STE  PICOUTGRX
      MKN  MOVED
      REX , CURPICS-LIST
      LGORR=SPECB*0=S-PICOUT1
 PICOUTGRX-
      JPO *
 PICOUT1-
      'STE  PICOUTX
      'DPX , PICOUT0
 PICOUT2-
      RSX ,1, LIST+PICBLKS+1
      1'AUX ,1, LIST-1
      DEX , 1
 PICOUT0-
      SXD ,*
      JPO  PICOUT3
      *JPO  DELETE
      RSX , PICOUT0
      JPO  PICOUT2
 PICOUT3-
      'DPX , PICOUT01
      RSX ,1, LIST+PPART+1
      1'AUX ,1, LIST-1
      DEX , 1
 PICOUT01-
      SXD ,*
 PICOUTX-
      JPO *
      *JPO  DELETE
      RSX , PICOUT01
      JPO  PICOUT3+1
      **REMOVE USELESS POINTS
 POINTSOUT-
      'STE  POINTSOUTGRX
```

```
        IES   ;XMX   ••6
        REX • CURPICS-LIST
        LGORR;SPECB••=S→POINTSOUT1
POINTSOUTGRX→
        JPQ •
POINTSOUT1→
        'STE  POINTSOUTX
        LGORR;PICBLKS••=S→PTSOUT1
POINTSOUTX→
        JPQ •
PTSOUT1→
        'STE  PTSOUT1X
        •LDE • LIST+TYPE
        'SED ( POINTS-LIST)
        JPQ •+1
PTSOUT1X→
        JPQ •
        •LDE • LIST+ATATAP
        'SED ( •)
        JPQ •+2
        JPQ  PTSOUT1X
        'DPX • PTSOUT2
        '5RSX T POINTS+SIZE
        INX • BWHOS+3
        DEX T BWHOS+2
        JPQ  PTSOUT1I
PTSOUT1A→
        •LDE • LIST
        •'STE  PTSOUT1B
        '7SED  E
        JPQ  PTSOUT1B
        JPQ  PTSOUT1X
PTSOUT1B→
        SXD •'
        JPQ •+2
        JPQ  PTSOUT1X
        INX • 2
PTSOUT1I→
        -2JPX T PTSOUT1A
PTSOUT2→
        REX •'
        •JPQ  DELETE
        MKN  MOVED
        JPQ  PTSOUT1X
        ••MAKE POINT • BE ON CIRCLE•
MPBOC→  'STE  MPBOCX
        MAKA=ONCIRCLES→Y
        PUT IPBOCP,Y→VCON,•
        RSX SI• CIRCEN+LIST
        PUT IPBOCC,Y→VCON,S
        RSX SI• CSP+LIST
```

```
        PUT |PBOCS,Y→VCON,S
 MPBOCX→JPQ #
        **MAKE POINT # BE ON LINE#
 MPBOL→ 'STE MPBOLX
        MAK A#ONLINES→Y
        PUT |PBOLP,Y→VCON,#
        RSX S|# LSP+LIST
        PUT |PBOLS,Y→VCON,S
        RSX S|# LEP+LIST
        PUT |PBOLE,Y→VCON,S
 MPBOLX→JPQ #
        **CONSTRAIN A POINT
 CONAP→ 'STE MACAPX
        JPQ MACAPT
        **MAKE AND CONSTRAIN A POINT
 MACAP→ 'STE MACAPX
        RSX Y ATBITS
        SXG Y #
        JPQ #+1
        RSX # ATBITS+1
        RSX Y|# LIST+TYPE
        SXD Y POINTS-LIST
        JPQ MACAP1
        MAK A#POINTS→#
        MOVE|PSPL→VA#
        MOVE|PSPL+1→VA+1#
        SXD Y TPVALS-LIST
        JPQ #+2
        JPQ MACAPT
        #JPQ MERGER
        DPX # ATBITS+1
        RSX Y|# LIST+TYPE
        'DPX Y ATBITS+1
        JPQ MACAPX
 MACAPT→RSX Y ATBITS
        JPQ MACAPTX+1
 MACAPA→'DPX Y MACAPTX
        SXD Y #
        DPX ' MACAPTX
        RSX #|Y ATBITS+1
        RSX Y|# LIST+TYPE
        SXD Y LINES-LIST
        JPQ #+4
        SXD Y CIRCLES-LIST
        #JPQ MPBOC
        JPQ #+2
        #JPQ MPBOL
 MACAPTX→
        REX Y #
        -'JPX Y MACAPA
```

```
            IES  1XMX   010
        JPQ  MACAPX
MACAP1←RSX  0  ATBITS+1
MACAPX←JPQ  0
MAKETEXT←
        'STE  MAKETEXTX
        SKZ  LPLOST
        JPQ  MAKETEXTX
        ⁎JPQ  STOPMOVEP
        MAK A≡TEXTS←0
        LDA B≡P SPL
        STAB≡LIST+TVAL+2,
        LDA  SCSZ
        MUL  ( 10.)
        DPX  B
        STAB≡LIST+TVAL,
        DPX  0|0  LIST+TXTS
        MOVE|(  47,47,,47,47)←LIST+TXTS+1,
        ⁎JPQ  MTDIS
        MKN  SHAFTUSE
MAKETEXTX←
        JPQ  0
MAKESCALER←
        'STE  MAKESCALERX
        SKZ  LPLOST
        JPQ  MAKESCALERX
        ⁎JPQ  STOPMOVEP
        MAK A≡SCALERS←B
        MAK A≡NUMBERS←0
        PUTL≡NTOSHO⁎0←SSHOW⁎B
        LDAB≡P SPL
        STAB≡NVAL+LIST+2,
        LDA  SCSZ
        MUL  ( 10.)
        DPX  B
        STA  SVAL+LIST,
        STAB≡NVAL+LIST,
        ⁎JPQ  MTDIS
        MKN  SHAFTUSE
MAKESCALERX←
        JPQ  0
MAKECONS←
        'STE  MAKECONSX
        SKZ  LPLOST
        JPQ  MAKECONSX
        ⁎JPQ  STOPMOVEP
        RSX  A  ATBITS
        SXG  A  0
        JPQ  MAKECONS1
        RSX  A  ATBITS+1
        RSX  A|A  LIST+TYPE  ⁎⁎A AT MOVS
```

```
        IES  2XMX  ,11
     RSX  .1.  LIST+TYPE
     SXD  .  CONSTRAINTS-LIST
     JPQ  MKCN1X+1
MAKECONS1-
     REX  .  CONSTRAINTS-LIST
     LGORRESPECB*A=S-MKCN1
MAKECONSX-
     JPQ  *
MKCN1-  ¹STE  MKCN1X
     ¹LDE  .  LIST+CONLET
     ¹SED  NEWCONTOG
     JPQ  *+2
MKCN1X-JPQ  *
     MAKA-*
     ¹DPX  .  MKCN3
     ¹⁵RSX  .1.  LIST+TYPE
     LDA  SCSZ
     MUL  (100.)
     STA  B
     DPX  A
     DEX  .  CVTS+2
     INX  .  CVTS+2
     JPQ  MKCN2X
MKCN2-  MAKA*TPVALS-Y
     PUTL*0x*-VCON*Y
     STA  MKCN2A
     STB  MKCN2B
     ADD  PSPL
     STA  TPVAL+LISTy
     LDA  B
     ADD  PSPL+1
     STA  TPVAL+LIST+1y
     COM  MKCN2A
     LDB  MKCN2A
     LDA  MKCN2B
     INX  .  2
MKCN2X-⁻²JPX  .  MKCN2
MKCN3-  REX  .*
     *JPQ  MOVE*
     JPQ  MAKECONSX
MOVEPIC-
     ¹STE  MOVEPICEX
     MKN  MOVED
     SKZ  LPLOST
     JPQ  MOVEPICEX-1
     MOVEIPSPL-SCCEN
     MOVEIPSPL+1-SCCEN+1
     JPQ  MOVEPICEX
     *JPQ  GARBAGE
MOVEPICEX-
     JPQ  *
```

```
MTOIS- 'STE   MOVETHISX
        RSX 8|0 LIST+BWHOS
        MOVEL#BWHOS*0-PPARTM*8
        JPQ #+2
MOVETHIS-
        'STE   MOVETHISX
        REX 8 MOVINGS-LIST
        MOVEL#VORD*0-SPECB*8
        'DPX 8|0 VORD+LIST
MOVETHISX-
        JPQ #
SUBPIC-'STE   SUBPICEX
        SKZ   LPLOST
        JPQ   SUBPICEX
        RSX S MOVINGS+SPECB+1
        16AUX SIS LIST-1
        DEX S 1
        RSX 0|S LIST+TYPE
        SXD 0 INSTANCES-LIST
        JPQ   SUBPIC2
SUBPIC1-
        SKN   ATINS
        JPQ   SUBPIC3
        RSX S ATBITS+1
SUBPIC2-
        LDAB#IVAL+LISTS
        STAB#NIRR
        0BIWHAT.S
        JPQ   SUBPICS
SUBPIC3-
        MOVE|NITOG-NINAME
        MOVE|SCSZ-NIRR
        MZR 1.1 NIRR
        MZR 1.1 NIRR
        DPX   NIRR+1
        REX 0 PICTURES-LIST
        LGORR#SPECB*0=S-SUBPICR-SUBPICEX
SUBPICR-
        'STE #+4
        *LDE 0 LIST+PNAME
        'SED   NINAME
        JPQ   SUBPICS
        JPQ #
SUBPICS-
        'DPX 0#+2     **MAKE I(THIS)
        *JPQ   STOPMOVEP
        REX Y#
        MAKA#INSTANCES-0
        MKN   SHAFTUSE
        LDAB#NIRR
```

```
        STAB=IVAL+LIST.
        LDAB=PSPL
        STAB=IP.
        PUT|IWHAT.0-PINS.Y
        LGORR=PATAP*Y=S-SUBPIT-SUBPIT1
SUBPIT- 'STE   SUBPITX
        RSX  S|Y LIST+TYPE
        SXD  S POINTS-LIST
        JPQ  *+2
SUBPITX-
        JPQ  *
        MAKA=IPCONS-B
        PUT|IPCV.B-IPCOTP.Y
        PUT|IPCI.B-VCON.0
        MAKA=POINTS-Y
        PUT|IPCP.B-VCON.Y
        JPQ   SUBPITX
SUBPIT1-
        *JPQ  MOVE0
SUBPICEX-
        JPQ  *
NINAME- 0
NIRR-   0
        0
FIXIT-  'STE   FIXITEX
        REX , FIXEDS-LIST
        SKZ   LPLOST
        JPQ   FIXITEX
        RSX , ATBITS
        SXG , 0
        JPQ   FIXITEX
        RSX , ATBITS+1
        MOVEL=VORD*0-SPECB*B
        'DPX  B|0 LIST+VORD
FIXITEX-
        JPQ  *
DESIGIT-
        'STE   FIXITEX
        REX , DESIGS-LIST
        JPQ   FIXIT+2
UNFIX-  'STE   UNFIXEX
        REX , FIXEDS-LIST
        LGORR=SPECB*0=S-UNFIX1
        REX , DESIGS-LIST
        LGORR=SPECB*0=S-UNFIX1
UNFIXEX-
        JPQ  *
UNFIX1-SUBR=(LTAKE=VORD*0)
MAKPATA-
        'STE   MAKPATAX
```

```
                IES  2XMX  α14
        SKZ  LPLOST
        JPQ  MAKPATAX
        RSX α ATBITS
        SXG α α
        JPQ  MAKPATAX
        RSX α ATBITS+1
        RSX β|α LIST+BWHOS
        MOVEL≡ATATAP*α←PATAP*β
        'DPX β|α LIST+ATATAP
MAKPATAX←
        JPQ #
TRUEUP←'STE  TRUEUPX
        SKN  ATLINE
        JPQ  TRUEUP1
        MAKA≡MOVS←q
        RSX β ATBITS+1
        RSX γ|β LSP+LIST
        PUT|MOVP1,q←VCON,γ
        RSX γ|β LEP+LIST
        PUT|MOVP2,q←VCON,γ
        JPQ  TRUEUPX          ← MKM MOVED
TRUEUP1←
        SKN  ATINS
        JPQ  TRUEUPX
        MAKA≡IBVERTS←α
        RSX β ATBITS+1
        PUT|IBVW,α←VCON,β
TRUEUPX←
        JPQ #
STARTDRAW←
        'STE  STARTDRAWEX
        SKZ  LPLOST
        JPQ  STARTDRAWEX
        *JPQ  STOPMOVEP
        *JPQ  MACAP
        MAKA≡POINTS←γ
        LDAB≡PSPL
        STAB≡VAγ
        SNZ  DESIGNATED
        JPQ  STARTL
STARTC←MAKA≡CIRCLES←β
        'DPX β STARTCA
        MAKA≡ONCIRCLES←β
        PUT|PBOCS,β←VCON,α
        PUT|PBOCP,β←VCON,γ
        RSX δ CCENT
        PUT|PBOCC,β←VCON,δ
STARTCA←
        REX β#
        PUT|CEP,β←PLS,γ
```

```
            IES   2XMX   015
    PUT ICSP,8-PLS,0
    RSX 4 CCENT
    PUT ICIRCEN,8-PLS,4
    JPQ  STARTT
STARTL-MAKABLINES-8
    PUT ILSP,8-PLS,0
    PUT ILEP,8-PLS,7
STARTT-REX 0|7
    *JPQ  MOVE*
STARTDRAWEX-
    JPQ *
DESIGNATE-
    'STE  DESIGNATEND
    SKN  LPLOST
    JPQ *+1
    SNZ  DESIGNATED
    JPQ  DESIGNATEND
    RSX 0 CCENT
    JPQ *+1
    *JPQ  MACAP
    EXX 0 CCENT
    SNN  DESIGNATED
    JPQ *+1
    SKN 1,1 DESTS        **OLD POINT AT LINE
    *JPQ  DELETE
    MOVEB*ATPOINT-21*DESTS
DESIGNATEND-
    JPQ *
MOVEPOINT-
    'STE  MOVEPOINTEX
    SKZ  LPLOST
    JPQ  MOVEPOINTEX
    *JPQ  STOPMOVEP
    RSX 0 ATBITS
    SXG 0 0
    JPQ  MOVEPOINTEX
    RSX 0 ATBITS+1
    *JPQ  MOVE*
    MKN  MOVED
MOVEPOINTEX-
    JPQ *
MOVE*- 'STE  MOVE*X
    RSX SI0 LIST+TYPE
    RSX TIS LIST+TYPE
    SXD T CONSTRAINTS-LIST
    JPQ  MOVE*C
    SXD T TOPOS-LIST
    JPQ  MOVE*T
    SXD T VARIABLES-LIST
    JPQ  MOVE*V
```

```
                IES  2XMX/016
        JPQ   MOVE*X
MOVE*C-RSX TIS LIST+CHVAR
        INX TIT
        JPQ   MOVE*CT
MOVE*T-SXD S PICTURES-LIST
        ERROR**-MOVE*X
        15RSX TI* LIST+TYPE
        DEX T VORD+2
MOVE*CT-
        1DPX *  MOVE*CT1
        -2JPX T *+5
        MKN  SHAFTUSE
        RSX *  MOVE*CT1
        JPQ   MOVE*D
         *
        DPX T*-1
MOVE*CT1-
        INX T*
        RSX *IT LIST+VORD+2
        RSX SI* LIST+TYPE
        RSX TIS LIST+TYPE
        SXD T VARIABLES-LIST
        JPQ *+2
        ERROR**-MOVE*X
        *JPQ   MOVE*VSS
        RSX T MOVE*CT1-2
        JPQ   MOVE*CT+1
MOVE*V-*JPQ   MOVE*VSS
        JPQ *+2
MOVE*D-*JPQ   MOVE*MVG
MOVE*X-JPQ *
MOVE*VSS-
        1STE  MOVE*VSSX
        SXD S INSTANCES-LIST
        JPQ *+3
        *JPQ   MOVE*VS
MOVE*VSSX-
        JPQ *
        LGORR*VCON**=S-MOVE*I1
        REX S INSTANCES-LIST
        JPQ   MOVE*VSSX-1
MOVE*I1-
        1STE  MOVE*VSX
        RSX SI* LIST+TYPE
        SXD S IPCONS-LIST
        JPQ *+2
        JPQ   MOVE*VSX
        RSX *I* LIST+IPCP
        RSX SI* LIST+TYPE
        JPQ   MOVE*VS+1
```

```
MOVE:VS-
        'STE   MOVE:VSX
        RSX TIS LIST+TUPLE
        SXD T 4
        MKN   SHAFTUSE
        SXD S INSTANCES-LIST
        JPQ   MOVE:V1
        SXD S POINTS-LIST
        JPQ   MOVE:V2
        '5RSX TI: LIST+TYPE
        SXD T 14
        JPQ   MOVE:V1
        SXD T 18
        JPQ   MOVE:V2
        ERROR:T-MOVE:VSX
MOVE:V2-
        LGORR:PLS:::S-MOVE:IPM
MOVE:V1-
        LGORR:VCON:::S-MOVE:IPM
        :JPQ   MOVE:IPM
        :JPQ   MOVE:MVG
MOVE:VSX-
        JPQ :
MOVE:IPM-
        'STE   MOVE:IPMX
        RSX :I: LIST+BWHOS
        MOVEL:BWHOS::-PPARTM::
MOVE:IPMX-
        JPQ :
MOVE:MVG-
        'STE   MOVE:MVGX
        REX : MOVINGS-LIST
        MOVER:VORD::-SPECB::
        'DPX :I: LIST+VORD
MOVE:MVGX-
        JPQ :
MERGEIFP-
        'STE   MERGEIFPX
        RSX SI: LIST+TYPE
        RSX TI: LIST+TYPE
        SXD SIT
        JPQ   MERGEIFPX-1
        SXD S TPVALS-LIST
        JPQ :+4
        SXD T TPVALS-LIST
        JPQ   MERGEIFP1
        JPQ   MERGEIFPX
        RSX SIT LIST+TYPE
        JPQ :+2
MERGEIFP1-
        RSX SIS LIST+TYPE
```

```
            IES   ,XMX_ .,.
      SXD S VARIABLES-LIST
      .JPQ  MERGER
MERGEIFPX-
      JPQ .
STOPMOVEP-
      'STE  STOPMOVEX
      MKN   MOVINGDONE
      MKZ   SHAFTUSE
      REX . CURPICS-LIST
      LGORR=SPECB..=S-STOPMOVEP1
      RSX . MOVINGS+SPECB+1
      SXD . MOVINGS-LIST+SPECB+1
      JPQ   STOPMOVEX
      1'AUX .|. LIST-1
      DEX . 1
      .JPQ  STOPM1
      .JPQ  STOPTAKE
      RSX . ATBITS+1
      RSX S ATBITS
      SXD S 1
STOPMOVEPB-
      .JPQ  MERGEIFP
      DPX . ATBITS+1
      RSX .|. LIST+TYPE
      'DPX . ATBITS+1
      DPX   ATBITS
      SXD . LINES-LIST
      MKN   ATLINE
      SXD . CIRCLES-LIST
      MKN   ATCIRCLE
      SXD . INSTANCES-LIST
      MKN   ATINS
      SXD . POINTS-LIST
      MKN   ATPOINT
      MKN 1.1 ATBITS
STOPMOVEPA-
      REX . MOVINGS-LIST
      LGORR=SPECB..=S-STOPTAKE
STOPMOVEX-
      JPQ .
STOPMOVEP1-
      'STE  STOPMOVEP1X
      LGORR=PPARTM..=S-STOPMOVEP2
STOPMOVEP1X-
      JPQ .
STOPMOVEP2-
      'STE  STOPMOVEP2X
      RSX S|. LIST+TYPE
      RSX S|S LIST+KIND
      RSX .|. LIST+BWMOS
```

```
          IES  2XMX  021
     SXD  S JUNKK
     JPQ   STOPMOVEP2J
     SXD  S DISPLAYK
     JPQ   STOPMOVEP2D
     ERROR=S-STOPMOVEP2X
STOPMOVEP2J-
     MOVEL=BWHOS==-PICBLKS=8
     JPQ   STOPMOVEP2X
STOPMOVEP2D-
     MOVEL=BWHOS==-PPART=8
STOPMOVEP2X-
     JPQ  *
STOPTAKE-
     SUBR=(LTAKE=VORD==)
STOPM1-'STE   STOPM1X
     RSX  Y1= LIST+TYPE
     SXD  Y POINTS-LIST
     JPQ   STOPM2
STOPM1X-
     JPQ  *
STOPM2-'DPX = STOPM3T
     LGORR=VCON==S-STOPM3-STOPM4
STOPM3-'STE   STOPM3X
     *LDE = LIST+TYPE
     *'SED ( ONLINES-LIST)
     JPQ   STOPM3L
     'SED ( ONCIRCLES-LIST)
     JPQ   STOPM3C
STOPM3X-
     JPQ  *
STOPM3C-
     LDA = LIST+PBOCC
     ''LDA = LIST+PBOCS
     RSX  S1= LIST+PBOCP
     JPQ   STOPM3T
STOPM3L-
     LDA = LIST+PBOLE
     ''LDA = LIST+PBOLS
     RSX  S1= LIST+PBOLP
STOPM3T-
     SXD  S*        **MOVING POINT
     JPQ  *+2
     JPQ   STOPM3X
     RSX  S ATBITS
     JPQ   STOPM3AI
STOPM3A-
     DPX  S STOPM3S
     RSX  *1S ATBITS+1
     RSX  Y1= LIST+TYPE
     SXD  Y LINES-LIST
```

```
              IES   ,XMX   .22
         JPQ   STOPM;AL
         SXD  Y CIRCLES-LIST
         JPQ   STOPM;AC
         JPQ   STOPM;AI
 STOPM;AL→
         LDB , LIST+LEP
       ²²LDB , LIST+LSP
         JPQ   STOPM;AT
 STOPM;AC→
         LDB , LIST+CSP
       ²²LDB , LIST+CIRCEN
 STOPM;AT→
        .LDE   B
        .SED   A
         JPQ  *+2
       ¹⁷SED   A
        .JPQ   DELETE
         RSX  S STOPM;S
 STOPM;AI→
       ⁻¹JPX  S STOPM;A
         JPQ   STOPM;X
 STOPM<→.JPQ   CONAP
         JPQ   STOPM;X
         **MERGE . AND ,
 MERGER→'STE   MERGEX
         MKN   MRGRFTT**FIRST TIME THRU
         SXD  .|,
         JPQ   MERGEX
 MERGERBAC→
         RSX  S|. LIST+TYPE
         RSX  T|, LIST+TYPE
         SXD  S|T
         JPQ   MERGERB
         SXD  S TPVALS-LIST
         JPQ  *+4
         SXD  T TPVALS-LIST
         JPQ  *+6
         ERROR=.→MERGEX
         RSX  T|T LIST+TYPE
         SXD  T VARIABLES-LIST
         JPQ   MERGERC
         ERROR=T→MERGEX
         RSX  S|S LIST+TYPE
         SXD  S VARIABLES-LIST
         JPQ   MERGERD
         ERROR=S→MERGEX
 MERGERB→
         SXL  ',|.
         JPQ   MERGERD
 MERGERC→
         DPX  . MERGTS
```

```
            IES  2XMX  023
        EXX , MERGTS
        RSX , MERGTS
 MERGERD←
        ↓LDE , LIST+BWHOS
        SED , LIST+BWHOS
        JPQ *+2
        ERROR#0←MERGEX
        SZZ  MRGRFTT
        1DPX , MRGR9
        RSX SI, LIST+TYPE
        SXD S POINTS-LIST
        JPQ *+2
        MKN  MOVED
 MERGERA←
        DPX , MRGRL
        DPX , MRGRU
        MOVE(LIST,←MRGTP
        15RSX YI, LIST+TYPE
        DEX Y 2
        JPQ  MRGRX
 MRGR1← ↓LDE , LIST
        ↓SED , LIST
        JPQ  MRGR4  **BOTH ARE SAME
        21SED , LIST
        JPQ *+2
        ERROR#8←MERGEX      **LEFT SIDE DIFFERS
        ↓LDE , LIST
        1SED ( 0)
        JPQ  MRGR2
        ↓LDE , LIST
        1SED ( 0)
        JPQ  MRGR3
        JPQ  MRGR6
 MRGR2← ↓17LDE , LIST+1
        ↓RSX S E
        1SED , LIST+1
        JPQ *+2
        ERROR#0←MERGEX      **NOT EMPTY KEY
        SXD SI, 1
        JPQ  MRGRX
        ERROR#0←MERGEX      **NOT EMPTY KEY
 MRGR3← ↓17LDE , LIST+1
        ↓RSX S E
        1SED , LIST+1
        JPQ *+2
        ERROR#0←MERGEX      **NOT EMPTY KEY
        SXD SI, 1
        JPQ  MRGR3A
        ERROR#0←MERGEX      **NOT EMPTY KEY
 MRGR3A←MOVE(LIST,←LIST,
```

```
            IES   2XMX    024
       MOVE|LIST+1 b→ aLIST+1 a
       RSX  S E
       REX  T|a 1
       2DPX T|S LIST
       2RSX S|a LIST+1
       1DPX T|S LIST
       REX  T|b 1
       1DPX |b LIST
       a1DPX T E
       a2DPX T E
       STE  b LIST+1
       JPQ  MRGRX
MRGR4→ aLDE a LIST
       1SED ( a)
       JPQ  MRGR5
       LTAKE≡a×b
       JPQ  MRGRX
MRGR5→ DPX  b MRGRTS
       RSX  b|b LIST+1
MRGR5A→aLDE b LIST-1
       1SED ( a)
       JPQ  MRGR5B
       MOVE|MRGRL→1 LIST-1 b
       RSX  b|b LIST
       JPQ  MRGR5A
MRGR5B→RSX  b MRGRTS
       RSX  S|a LIST+1
       2RSX T|b LIST+1
       2DPX T|S LIST
       1DPX S|T LIST
       REX  S|a 1
       RSX  T|b LIST+1
       1DPX T|S LIST
       2DPX S|T LIST
       REX  T|b 1
       aDPX T E
       a2DPX T E
       STE  b LIST+1
MRGRX→ -2JPX y MRGRXA
MRGR7→ RSX  a MRGRU
       aJPQ DELETE
MRGR8→ REX  a MERGERS-LIST
       LGORR≡SPECB×a=S→MRGR10→MRGR9
MRGR10→RSX  b|a LIST+VORD+1
       DEX  b 1
       16AUX b|b LIST
       LTAKE≡VORD×a
       LTAKE≡VORD×b
       JPQ  MERGERBAC
MRGR6→ RSX  a|a LIST+×a IS POINTED AT THING
```

```
        IES  ;XMX  •;5
        RSX  S|a  LIST+TYPE
        SXD  S  PICTURES-LIST
        ERROR=a→MERGEX
        RSX  S|S  LIST+TYPE
        SXD  S  MASTERS-LIST
        ERROR=a→MERGEX
        'DPX  a  MRGR#A
        RSX  a|=  LIST
        RSX  S|a  LIST+TYPE
        SXD  S  PICTURES-LIST
        ERROR=a→MERGEX
        RSX  S|S  LIST+TYPE
        SXD  S  MASTERS-LIST
        ERROR=a→MERGEX
        LTAKE=••=
        REX  ‹  MERGERS-LIST
        MOVEL=VORD•a→SPECB•‹
        'DPX  ‹|a  VORD+LIST
MRGR#A→ REX  a#
        MOVEL=VORD•a→SPECB•‹
        'DPX  ‹|a  LIST+VORD
        JPQ  MRGRX
MRGRXA→ INX  •  ;
        INX  •  ;
        JPQ  MRGR;
MRGR•→  REX  •#        **FIRST MERGER RESULT
MERGEX→ JPQ  #
DUMMY→  'STE  DUMMEX
        REX  •  MOVINGS-LIST
        LGORR=SPECB••=S→DUMMYA
        SKN  ATINS
        JPQ  DUMMEX
        RSX  •  ATBITS+;       **OLD INSTANCE
        MKN  MOVED
        JPQ  DUMMYB
DUMMYA→ 'STE  DUMMYAX
        RSX  S|•  LIST+TYPE
        SXD  S  INSTANCES-LIST
        JPQ  DUMMYB
DUMMYAX→
        JPQ  #
DUMMYB→ REX  y  PICTURES-LIST
        LGORR=SPECB•Y=S→DUM;→DUMMEX
DUM;→   'STE  #+‹
        •LDE  y  LIST+PNAME
        'SED  NITOG
        JPQ  DUM;
        JPQ  #
DUM;→   MOVEL=IWHAT••→PINS•Y
        'DPX  y|•  LIST+IWHAT
```

```
                IES  2XMX   026
DUM3-   'RSX  y|y  LIST+PATAP+1
        LGORR≡VCON×0=S-DUM4-DUM6
DUM4-   'STE   DUM4X
        *LDE 0  LIST  **0  IS  IPCON?
        'SED  (  IPCONS-LIST)
        JPQ  *+2
DUM4X-  JPQ  *
        *LDE y  LIST-1
        *'SED  ( 0)
        JPQ   DUM5    **OUT OF POINTS
        '6RSX 8|y  LIST-1
        INX 8|y
        DEX 8  1
        MOVEL≡IPCV×0-IPCOTP×8
        'DPX 8|0  IPCV+LIST
        'RSX y|y  LIST
        JPQ   DUM4X
DUM5-   DPX  y*+2
        *JPQ   DELETE
        REX  y*
        JPQ   DUM4X
DUM6-   *LDE y  LIST-1
        *'SED  ( 0)
        JPQ   DUM7
        '6RSX 0  E     **NEED MORE POINTS
        INX 0|y
        DEX 0  1        **0  IS  NEW  VIRG  PT
        MAKA≡IPCONS-8
        PUT|IPCV.8-IPCOTP.0
        RSX  0  ATBITS+1
        PUT|IPCI.8-VCON.0
        MAKA≡POINTS-0
        PUT|IPCP.8-VCON.0
        'RSX y|y  LIST
        JPQ   DUM6
DUM7-   RSX  0  ATBITS+1
        LDAE≡LIST+IVAL0
        STAE≡MATM
        RSX  y|0  LIST+IWHAT
        LDA  y  LIST+PSIZE
        STA   MATD
        LGORR≡VCON×0=S-DUM8
DUMMEX- JPQ  *
DUM8-   'STE   DUM8X
        RSX  S|0  LIST+TYPE
        SXD  S  IPCONS-LIST
        JPQ  *+3
DUM8X-  JPQ  *
        RSX  T|0  LIST+IPCV
        LDAB≡VAT
```

```
        RSX •|• LIST+IPCP
        STABₑVA₀
        RSX SI• LIST+TYPE
        •BPQ s LIST+MOVIT
        JPQ  DUM•X
        ••DEVELOP LINES FROM INSTANCE
UNMAC→  'STE  UNMACEX
        SKZ  LPLOST
        JPQ  UNMACEX
        SKN  ATINS
        JPQ  UNMACEX
        RSX • ATBITS+₁
        REX s ₁
        LDA SI• LIST+IVAL
        STA s MATM
        ⁻'JPX s*-₂
        RSX •|• LIST+IMHAT
UNMAC₁→LDA • LIST+PSIZE
        STA  MATD
        LDABₑMATM
        •JPQ  PYTHAGORIAN
        STA  MATS
        •JPQ  COPYINT       ••COPY STUFF
        •JPQ  STOPMOVEP
UNMAC₂→RSX • ATBITS+₁
        LGORRₑVCON•₀=S→UNMAC₃→UNMAC₄
UNMAC₃→'STE  UNMAC₃X
        •LDE • LIST+TYPE
        'SED ( IPCONS-LIST)
        JPQ *+₂
UNMAC₃X→
        JPQ *
        •EIPCP.•
        •EIPCV.•
        'RSX •|• LIST+₁
        DEX • ₁      •••=COPIED POINT
        LDABₑVA₂
        STABₑVA₀
        •JPQ  MERGER
        JPQ  UNMAC₃X
UNMAC₄→RSX • ATBITS+₁
        •JPQ  DELETE
        DPX  ATBITS
        MKN  MOVED
UNMACEX→
        JPQ *
COPYINT→
        'STE  COPYMOVE-₁
        JPQ  COPYITA
COPYIST→
        'STE  COPYX
```

```
            IES  1XMX  0 10
        MOVEI( COPYMOVE)-1 COPYMOVE-1
        SKZ  LPLOST
        JPQ  COPYX
        *JPQ  STOPMOVEP
        REX . PICTURES-LIST
        LGORR#SPECB*#=S-COPY1-COPYX
  COPY1- 'STE  COPY1X
        *LDE . LIST+PNAME
        'SED  COPYNUM         ** #PIC TO COPY
        JPQ  COPYIT
  COPY1X-JPQ  *
  COPYIT-LDA  SCSZ
        MUL  (100.)
        STA  MATM
        STA  MATS
        DPX  MATO
        LDAB#PSPL
        STAB#MATRX
        LDA . LIST+PSIZE
        STA  MATD
  COPYITA-
        DPX . COPYPIC         **PIC TO COPY
        LGORR#PPART**=S-COPYDUP
        LGORR#PICBLKS**=S-COPYDUP-COPYFLS
  COPYDUP-
        'STE  COPYDUPX
        *ΒTYPE.*
        MOVEL#TYPE**-SPECB*A          **PUT IT FIRST
        MAKA-Y         **MAKE A NEW ONE
        16RSX SIY LIST
        15RSX TIY LIST
        DEX SIT
        JPQ  *+4
        *LDE *IT LIST
        STE YIT LIST
        INX T 1
        -1JPX S*-1
        REX *IY
        SΒTYPE.*
        *BPQ S LIST+MOVIT
  COPYDUPX-
        JPQ  *
  COPYFLS-
        RSX . COPYPIC
        LGORR#PPART**=S-COPYFIX
        LGORR#PICBLKS**=S-COPYFIX-COPIED
  COPYFIX-
        'STE  COPYFIXEX
        RSX *I* LIST+1
        DEX * 1        ** *=NEW THING
```

```
        IES  ₂XMX  ₀₁₁
    RSX Y|₈ LIST+BWHOS
    MOVEL₈BWHOS×₈→PPARTM×Y
COPYFIXT→
    ¹⁵RSX S|₈ LIST+TYPE
    SXL S ⁵        ** QUIT
    JPQ *+₂
COPYFIXEX→
    JPQ *
    DEX S ²
    ¹DPX S COPYFIXI       ** FILTER OUT
    *LDE S|₀ LIST         ** NEXT TIE
    ₈¹SED ( ₀)  ** EMPTY?
    JPQ COPYFIXI
    RSX Y E          ** Y IS WHERE TIE IS TO
    SXD Y* COPYPIC        ** TO OWN PICTURE?
    JPQ COPYFIXI
    RSX S|Y LIST+TYPE
    RSX T|S LIST+TYPE
    SXD T MASTERS-LIST
    JPQ COPYFIXI
COPYFIXA→
    SXD S PICTURES-LIST
    JPQ COPYFIXB          ** PUT ₈ IN Y
    RSX S|Y LIST+BWHOS
    SXD S* COPYPIC
    JPQ *+₂
    JPQ COPYFIXB
    RSX Y|Y LIST+TYPE+₁
    DEX Y ₁          ** Y=SHADOW
COPYFIXB→
    RSX T COPYFIXI
    *LDE T|₀ LIST+₁
    RSX T E
    *LDE T LIST-₁
    ¹SED ( ₀)
    JPQ *+₂
    RSX T|T LIST
    JPQ *-₄
COPYFIXC→
    ¹⁶RSX T|T LIST-₁
    ¹REX T|T
    REX ₆|₈
    AUX ₆ COPYFIXI
    ¹DPX Y|₆ LIST
    INX Y|T
    MOVEL₈₀×₆→₀×Y
COPYFIXI→
    REX S*
    JPQ COPYFIXEX-₂
COPIED→JPQ * ** EXIT FOR UNMAC
```

```
                IES  2XMX   032
COPYMOVE-
        RSX  S COPYPIC
        2RSX S|S LIST+PATAP+1
        8LDE S  LIST-1
        1SED ( 0)
        JPQ   COPYNOMOVE
        16RSX 0|S LIST-1
        INX  0|S
        RSX  0|0 LIST
        1DPX S  COPYMOVE1
        DEX  0 1        **0 THING TO MOVE
        8JPQ  MOVE0
COPYMOVE1-
        REX  0#
        2RSX 0|0 LIST
        8LDE 0  LIST-1
        1SED ( 0)
        JPQ   COPYX
        1DPX 0  COPYMOVE2
        16AUX 0|0 LIST-1
        RSX  0|0 LIST
        DEX  0 1
        RSX  S|0 LIST+TYPE
        SXD  S POINTS-LIST
        JPQ   COPYMOVE1P
        RSX  8 ATBITS
        SXD  8 1
        JPQ   COPYMOVE1A
        JPQ   COPYX
COPYMOVE1P-
        1DPX 0#+2
        8JPQ  MACAP
        REX  8#
        LDAB=VA0
        STAB=VA8
        8JPQ  MERGER
        JPQ   COPYMOVE2
COPYMOVE1A-
        1DPX 0#+2
        RSX  0 ATBITS+1
        REX  8#
        8JPQ  MERGEIFP
        1DPX 00ATBITS+1
COPYMOVE2-
        REX  0#
        REX  8 DESIGS-LIST
        LGORR=SPECB*8=S-COPYMOVE2A-COPYX
COPYMOVE2A-
        1STE  COPYMOVE2AX
        LTAKE=VORD*8
```

```
        IES  2XMX   .12
        RSX . COPYMOVE2
        2RSX .1. LIST
        1OPX . COPYMOVE2
        .LDE . LIST-1
        1SED ( .)
        JPQ  COPYX
        14AUX .1. LIST-1
        RSX .1. LIST
        DEX . 1
        .JPQ  MERGEIFP
COPYMOVE2AX-
        JPQ  .
COPYNOMOVE-
        .JPQ  STOPMOVEP
        MKN  MOVED
COPYX-  JPQ  .
ERASE-  1STE  ERASEX
        SKZ  LPLOST
        JPQ  ERASEX
        RSX . MOVINGS+SPECB+1
        SXD . MOVINGS-LIST+SPECB+1
        JPQ  ERASE1
ERASEA- 14AUX .1. LIST-1
        DEX . 1
        .JPQ  DELETE
        RSX . MOVINGS+SPECB+1
        SXD . MOVINGS+SPECB-LIST+1
        JPQ  ERASEX-1
        JPQ  ERASEA
ERASE1- RSX . ATBITS
        SXD . 1
        JPQ  ERASE2
        JPQ  ERASEX
ERASE2- RSX . ATBITS+1
        .JPQ  DELETE
        MKN  MOVED
ERASEX- JPQ  .
DELETE- 1STE  DELETEX
DELETER-
        .BTYPE..      ..IS . FORBIDDEN TYPE
        SXD . .
        JPQ  DEL1
        REX . DEADS-LIST
        MOVEL.TYPE..-SPECB..
        1OPX .1. LIST+TYPE
DEL1-   RSX . DEADS+SPECB+1
        .LDE . LIST-1
        1SED ( .)
        JPQ  DELETEX..DONE
        DEX . 1
```

```
         IES  2XMX  034
         15RSX B|0 LIST
         DEX B 2
         JPQ  DEL2X
DEL2-    INX 0 2      **NEXT TIE
         RSX Y|0 LIST+1
         SXD Y|0 1    **SKIP IF NON EMPTY
         JPQ  DEL2X
DEL3-    ALDE (0)
         1SED 0 LIST **SKIP IF NON KEY
         JPQ  DEL5
         LTAKE=0*0
DEL2X-   -2JPX B DEL3
DEL4-    RSX 0 DEADS+SPECB+1
         DEX 0 1      **FREE STORAGE LIST
         REX B FREES-LIST
         MOVEL=TYPE*0-SPECB*B
         1DPX B|0 LIST+TYPE
         JPQ  DEL1
DEL5-    DEX Y 1      **DELETE A THING IN A
         LTAKE=0*Y
         16RSX 0|Y LIST
         INX 0|Y
         JPQ  DELETER
DELETEX-
         JPQ 0
GARBAGE-
         1STE  GARBEX
         MKN  MOVED
         MOVE1( 377777)-1 GARB1
         RSX S FREES+SPECB+1
         SXD S FREES+SPECB-LIST+1
         JPQ  GARBEX
GARB1-   SXL S 377777
         JPQ  0+2
         1DPX S GARB1
         RSX S|S LIST
         SXD S FREES+SPECB-LIST+1
         JPQ  GARB2
         JPQ  GARB1
GARB2-   RSX 0 GARB1
         DEX 0 1
         REX B|0
GARB3-   LTAKE=TYPE*B
GARB4-   16AUX B|B LIST
GARB4A-  SXL B*AFFB
         JPQ  GARBDONE
         RSX T|B LIST
         SXD T FREES-LIST
         JPQ  GARB3
         MOVE1|6 LISTB-1 GARBS
```

FREES

```
              IES    2XMX    015
        DPX 0 GARBA
        DPX 8 GARBB
        INX 0 1
        15RSX T|8 LIST
        JPQ   GARB5
GARB5A→ RSX S|8 LIST+1
        2RSX Y|8 LIST+1
        2DPX 0|S LIST
        1DPX 0|Y LIST
        8LDE 8  LIST+1
        STE 0 LIST
        INX 0 2
        INX 8 2
        8LDE 8  LIST-2
        8STE 0  LIST-3
        1SED { 0}
        JPQ   GARB6
GARB5→  -2JPX T GARB5A
GARB7→  RSX 0 GARBA
        RSX 8 GARBB
        15RSX T|0 LIST
        1REX S|T
        16AUX S|0 LIST
        JPQ  *+4
        8LDE T|8 LIST
        STE T|0 LIST
        INX T 1
        -1JPX S *-3
        16AUX 0|0 LIST
GARBS→  INX 8 0
        JPQ   GARB4A
GARB6→  8LDE S  LIST-1
        1SED { 0}
        JPQ   GARB5
        8LDE  GARBA
        1STE S  LIST-1
        RSX S|S LIST
        JPQ   GARB8
GARBDONE→
        DPX 0 AFFB
GARBEX→ JPQ *
BLOCKMAKER→
        1STE  BLOCKMAKEREX
        18RSX S|4 SIZE+LIST
        8JPQ  GETBLOCKER
        8LDE 4  SIZE+LIST
        21STE T  LIST+TYPE
        REX S|T
        PUT ITYPE.S→ SPECB.4
        REX T|4
```

50

```
        IES  1XMA  0,-
        RSX A CURPICS+SPECB+1
        1ᴬAUX A|A LIST-1
        DEX A 1
        ALDE T LIST+KIND
        ASED ( PICTUREK)
        JPQ  BLOCKMAKEREX-1
        ASED ( DISPLAYK)
        JPQ  BLOCKM2
        SED ( JUNKK)
        JPQ  BLOCKM1
        ERROR#A-BLOCKMAKEREX
BLOCKM1-
        PUT IBWHOS,S-PICBLKS.A
        JPQ  BLOCKMAKEREX-1
BLOCKM2-
        PUT IBWHOS,S-PPART,A
        REX A|S
BLOCKMAKEREX-
        JPQ #
GETBLOCKER-
        1STE  GETBLOCKEX
        RSX T AFFB
        ADX S AFFB.
        6DPX S|T LIST
        5DPX S|T LIST
        INX S|T
        DEX S 1
GETBLOCK1-
        DPX S|S LIST
        2DPX S|S LIST
        DEX S 1
        SXD S|T
        JPQ  GETBLOCKEX
        DPX 0|S LIST
        ADPX S E
        ACOM  E
        AADX T E
        6STE S LIST
        -1JPX S GETBLOCK1
GETBLOCKEX-
        JPQ #
        **PLOTTER ORDERING PROGRAM
        ** ORD 711-14
ORDSTART-
        1STE  ORDGREXIT
        MKN  MOVED
        REX Y CURPICS-LIST
        LGORR#SPECB+Y=S-ORDCURPIC
ORDGREXIT-
        JPQ #
```

```
ORDCURPIC←
        'STE  ORDEXIT
        SKX  ▲ 0
        DPX  ORDSWITCHES
        LDA  (-1,#1)
        STA  ORDPX
        DPX  ORDPY
        **GROUP INSTANCES
        REX  0|Y
        LGORR≡PPART×0=8→ORDGRPI→ORDI
ORDGRPI←
        'STE  ORDGRPIEXIT
        ''RSX  S|0 LIST+TYPE
        ''RSX  S|S LIST+TYPE
        SXD  S VARIABLES-LIST
        JPQ  #+1
        MKZ  METAl0 LIST
ORDGRPIEXIT←
        JPQ  # **MODIFIED
        MOVER≡BWHOS×0→PPART×Y
ORDGRPI1←
        0'JPX ▲ ORDGRPIEXIT*
        JPQ  ORDGRPIEXIT*
        **ORDER INSTANCES
ORDI←   0⁻¹JPX ▲#+2
        JPQ  ORDGRPP
ORDI2←  SKX  1|▲ 0
        'DPX  ORDNXTPNT
        REX  0|Y
        LDA  (-1,#1)
        SKZ  ORDWORST
        DPX  A
        STA  ORDMIND
        SKZ  ORDISW
        JPQ  ORDP1
        LGORR≡PPART×0=8→ORDCALC→ORDERROR
ORDCALC←
        'STE  ORDCALCEXIT
        ''RSX  S|0 LIST+TYPE
        #BPQ  S LIST+WHERE
        STB  ORDWA2  ** A=X.B=Y
ORDC0←  SUB  ORDPX
        SCA  (-1,)
        SKZ  4.9 A
        COM  A
        STA  ORDWA1
        LDA  ORDWA2
        SKZ  ORDISW
        LDA  0 LIST+PVAL+1
        SUB  ORDPY
```

```
        SCA  (-1.)
        SKZ  4.5  A
        COM  A
        STA  ORDWA2
        SUB  ORDWA1
        JPA  ORDC1    **AY BIGGER
        LDA  ORDWA1
        STA  ORDWA2
        JPQ  *+2
ORDC1-  LDA  ORDWA2
        SUB  ORDMIND
        SKZ  ORDWORST
        JPQ  ORDWORST1
        JPA  ORDC2
ORDC1A- LDA  ORDWA2
        STA  ORDMIND
        'DPX .  ORDNXTPNT
ORDCALCEXIT-
        a-1 JPX  ,*    **MODIFIED
        ''RSX .  ORDNXTPNT
        SXD  . *
        JPQ  ORDGRPP
        SKZ  ORDISW
        JPQ  ORDP
        *JPQ  ORDMOVEL
        ''RSX  S1.  LIST+TYPE
        *BPQ  S  LIST+WHERE
        STA  ORDPX
        STB  ORDPY
        JPQ  ORDI
ORDMOVEL-
        'STE  ORDMOVELEXIT
        MOVEL=BWHOS*0-PPART*Y
ORDMOVELEXIT-
        JPQ  * **MODIFIED
ORDGRPP-
        SZN  ORDISW
ORDEXIT-
        JPQ  * **MODIFIED FINAL EXIT
        **GROUP POINTS
        SKX  4 *
        REX  .1Y
        LGORR=PICBLKS*0=8-ORDGRPP1-ORDI
ORDGRPP1-
        'STE  ORDGRPIEXIT
        ''RSX  S1.  LIST+TYPE
        SXD  S  POINTS-LIST
        JPQ  *+2
        JPQ  ORDGRPIEXIT*
        MOVER=BWHOS*0-PICBLKS*Y
```

```
                IES   1XMX    041
        0'JPX  4  ORDGRPIEXIT*
        JPQ   ORDGRPIEXIT*
        **ORDER POINTS
ORDP-   LGORR#PLS** =8-ORDP1 -ORDMP+1
ORDP1-  1STE   ORDPEXIT
        12RSX  8|8  LIST
        SKZ  METAL*  LIST
        JPQ   ORDMP
        11RSX  S|*  LIST
        SXD  S  CIRCLES-LIST
        JPQ   ORDCIRCLES
        SXD  8|*  LSP+1
        JPQ   ORDP1A
        11RSX  8|*  LIST+LSP
        1EXX  8|*  LIST+LEP
        1DPX  8|*  LIST+LSP
        JPQ  *+2
ORDP1A-11RSX  8|*  LIST+LSP
        MOVEL#LSP**-PLS*8
        11RSX  8|*  LIST+LEP
        MOVEL#LEP**-PLS*8
ORDP2-  MKN  METAL*  LIST
        *JPQ   ORDMOVEL
        11RSX  *|*  LIST+LEP
        LDA  *  LIST+PVAL
        STA   ORDPX
        LDA  *  LIST+PVAL+1
ORDP4-  STA   ORDPY
        SKZ   ORDWORST
        JPQ   ORDI2
        JPQ   ORDP
ORDCIRCLES-
        SXD  8|*  CIRCEN+1
ORDPEXIT-
        JPQ  *  **MODIFIED
        SXD  8|*  CSP+1
        JPQ   ORDCIRC1
        11RSX  8|*  LIST+CSP
        1EXX  8|*  LIST+CEP
        1DPX  8|*  LIST+CSP
        COM  *  LIST+CVAL
        JPQ  *+2
ORDCIRC1-
        11RSX  8|*  LIST+CSP
        MOVEL#CSP**-PLS*8
        11RSX  8|*  LIST+CEP
        MOVEL#CEP**-PLS*8
ORDCIRC2-
        MKN  METAL*  LIST
        *JPQ   ORDMOVEL
```

```
            IES   *XMX   *42
        ''RSX  SI* LIST+LEP
        *LDE  *  LIST+CVAL
        *SED  (,*1)
        ''RSX  SI* LIST+LSP
        SED  (-,*1)
        ''RSX  SI* LIST+LSP
ORDCIRC3-
        LDA  S  LIST+PVAL
        STA   ORDPX
        LDA  S  LIST+PVAL+1
        SKX  *IS *
        JPQ   ORDP4
ORDMP-  ''RSX  *I8  LIST-1
        MKZ  3.*  ORDMPSW     ** MAKE  JPQ
        MOVEL=BWHOS**-PICBLKS*Y
ORDMPSW-
        JPQ   ORDI     ** CHGD  TO  '4JNX ORDI
        *-1 JPX  A  ORDCALCEXIT
        JPQ   ORDCALCEXIT
ORDP3-  LGORR=PICBLKS**=8-ORDP5-ORDERROR
ORDP5-  'STE   ORDCALCEXIT
        MKN  3.*  ORDMPSW     ** MAKE  '4JNX
        ''RSX  SI*  LIST+PLS+1
        '6AUX  SIS  LIST-1
        SKZ  NETAIS  LIST-1
        JPQ   ORDMP+2
        SXD  SI*  1
        JPQ   ORDMP+2
        LDA  *  LIST+PVAL
        JPQ   ORDC*
ORDWORST1-
        JNA   ORDC2
        JPQ   ORDC1A
ORDERROR-
        'STE  *+1
        *.      ** MODIFIED
        JPQ   ORDSTART+2
ORDSWITCHES-
        *
ORDPX-  *
ORDPY-  *
ORDWA1- *
ORDWA2- *
ORDWA3- *
ORDMIND-
        *
ORDNXTPNT-
        *
ORDLAST-
        ORDLAST-ORDSTART+1
```

```
                IES   2XMX   0 43

        **MERGE POINTS PROGRAM

        ** MGP 726-1

MGPSTART-

        'STE  MGPEXIT

        SKX 0 CURPICS-LIST

        LGORR=SPECB*0=8-MGP MOVP-MGPEXIT*

MGPEXIT-

        .JPQ *          **FINAL EXIT MODIFIED

MGPMOVP-

        'STE  MGPMOVPX

        'DPX 0  MGPCURPIC

        ''RSX 8 MGPCURPIC

        SKX 1 0

        LGORR=PICBLKS*8=S-MGPMOVP1-MGPMGP

MGPMOVP1-

        'STE  MGPMOVP1X

        ''RSX S|8 LIST+TYPE

        SXD 5 POINTS-LIST

        JPQ *+2

MGPMOVP1X-

        .JPQ *          **MODIFIED

        MOVER=BWHOS*8-PICBLKS*0

        .'JPX 1 MGPMOVP1X*

        JPQ  MGPMOVP1X*

MGPMGP- SXL 1 2

        JPQ *+2

MGPMOVPX-

        JPQ * **ALL PNTS IN PICTURE ARE MERGED

        ** MERGE LOOP

MGP1-   DEX 1 1

        SKX 4|1 0

        ''RSX 8 MGPCURPIC

        MKZ META MGPSW

        LGORR=PICBLKS*8=S-MGP2-MGPERROR

MGP2-   'STE  MGP2X

MGPSW-  SZN META*

        JPQ  MGP3

        'DPX 8 MGPC

        LDA 8 LIST+PVAL

        STA  MGPVAL

MGPK-   LDA 8 LIST+PVAL+1

        STA  MGPVAL+1

MGP2X-  .-'JPX ,*     **MOD

        ''RSX 0 MGPCURPIC

        ''RSX 8 MGPC

        MOVEL=BWHOS*8-PICBLKS*0

        JPQ  MGPMGP

MGP3-   'SKX 0 1

        LDA 0 MGPK*

        SUB 0 MGPVAL+1
```

```
                IES   2XMX    0 44
          JPA *+2
          COM  A
          SUB ( TOL)
          JPA  MGP2X
          2'JNX 0  MGP3+1
          1'RSX 0  MGPC
          *JPQ  MERGER** MERGE BOTH BLKS
          DEX 1 1        ** ONE LESS BLOCK IN TABLE
          SXD 0  MGPC*
          JPQ  MGP2X
          INX 1 1
          JPQ  MGPMGP
MGPCURPIC-
          0
MGPC-     0
MGPVAL-   0
          0
MGPERROR-
          1STE *+1
          30     ** ERROR
          JPQ  MGPSTART+1
MGPLAST INSTR-
          *-MGPSTART+1
RI-       JPQ  177750
CL-       JPQ  200000
ST-       JPQ  200001
LAST-      ZZLAST
```

IES OPLW 001

76FAST=205574	H9.1=022125	PATAP
76LIGHTS=205605	H9.2=022133	PBOCC
76LOOP=205304	H9.3=022141	PBOCS
76LOOP1=205475	←HDIF	PBOCP
←76LOOPAA=205326	←HEAD	PBOLE
76LOOPBB=205335	←HEADER	PBOLS
76LOOPB=205331	HOLDERS	PBOLP
76LOOPBC=205346	HOVCODE	PICBLKS
76LOOPC=205357	HOVP1	PICCHANGE
76LOOPD=205375	HOVP2	PICTURES
76LOOPA=205401	HOVS	PICTUREK
76LOOP2=205534	HOWBIG	PINS
76MOV1=205417	←HSUM	PLCLEAN
76MOV1X=205423	IBVCODE	PLEND
76MOVIT=205460	IBVERTS	PLOTIT
76MOVITX=205464	IBVW	PLOTNOSCOPE
76PUT=205301	INSTANCES	PLOTBLOCKS
76PUT1=205302	IP	PLOTSTORAGE
76PUNCH=205561	IPCI	PLOTSUB=205613
76U=205553	IPCONS	PLOTSUBEX=205632
AF1=207201	IPCOTP	PLOTSUBA=205625
AF1A=207235	IPCP	PLOTSUBB=205636
AF1B=207252	IPCV	PLPLOT
AFANG	ISIZE	PLPLBUSY
AFCEN	IVAL	PLPUNCH
AFEND=207255	IWHAT	PLPUBUSY
AFFB	JUNKK	PLS
AFOVER=207245	KIND	PMAG
AFST	L1=022155	PNAME
*AFTT=207414	L2=022201	POINTS
*AFTV=207415	L3=022225	PPART
ANGFX=207254	LAST=207262	PPARTM
ANGLEFIX=207200	←LDAB	←PROD
ARCTAN	←LDAE	PSAVE
ATATAP	LEP	PSEUDO
BADOV=200100	LETMAG	PSIZE
BASICFILE	←LGORR	PSNEED
BLOCKMAKER	*LGORR1	PSPL
BWHOS	*LGORR0	PUNCHIT
CACT	*LGORREND	←PUTL
CCFR	*LGORR2	←PUTNAME
CEP	LINES	←PUTR
CHANGEPIC=204406	LIST	PVAL
CHANGE1=204425	LMAG	PWHOS
CHANGE2=204436	LMEND	PYTHAGORIAN
CHVAR	LMNAME	←PYTH1
CIRCEN	LMSTART	←PYTH
CIRCLES	LSP	Q1=022170
CL=207260	←LTAKE	Q14=022334

IES OPLW 002

CMAG	MAG=205643	Q2=022214
CMANG	MAG1=205732	Q3=022240
CMCEN	MAG1X=205735	Q4=022310
CMNAME	MAGCON=206125	Q5=022360
CMSTART	MAGC=205770	Q6=022430
-COMB	MAGCX=206034	Q7=022264
COMP	MAGC1=206022	Q8=022404
CONLET	MAGCONEXIT=206254	READIT
CONSTK	MAGCONXP=206265	RELAX
CONSTRAINTS	MAGCONYP=206266	RI=207257
CPEX=205272	*MAGCONT=207433	-ROTA
CPIC=204723	*MAGCONY=207434	ROTATER=207031
CPICX=205037	MAGCON1=206156	ROTATX=207067
CPIC1=204762	*MAGCONN=207435	*ROTS=207452
CPIC2=205001	MAGCON1X=206176	*ROTX=207450
CPICT=205040	*MAGCONT1=207436	*ROTY=207451
CPIC4=205036	*MAGCONYT=207437	S
CPIC3=205020	MAGCON2X=206234	SCALERS
CPII=205050	MAGCON2=206211	SCCEN
CPIIX=205077	MAGCONTAB=206255	SCSZ
CPIL=204707	MAGEX=205662	SHOWBLKS
CPILX=204722	MAGI=206543	SHOWCON
CPINUM=205100	MAGIX=206774	SHOWPOINTS
CPINUMX=205135	MAGI1=206561	SHOWINSASBOX
CPIP=204701	MAGIGO=206602	SHOWTOG
CPIPX=204706	MAGIGOA=206661	SHOWSCALERS
CPITXT=205136	MAGIASBOX=206635	SHOWTPVALS
CPITXTX=205170	MAGIGO1=206701	SIZE
CPIT=205245	MAGIGO2=206726	SIZER=206775
CPITT=205246	MAGILV=206754	SIZEX=207030
*CPMAXX=207420	MAGL=205736	-SKIE
*CPMAXY=207421	MAGLX=205767	SMASBL
*CPMINX=207416	MAGNUM=206323	SNDISP
*CPMINY=207417	MAGNUMEX=206363	SPECB
CPNAME	MAGPIC=205663	SPLAT
CPNOTT=205236	MAGP=206035	SPLATT
CPNS=205171	MAGPICX=205714	SPLATTT
CPNSX=205223	MAGPICA=205676	SQRT
CPSX=205225	MAGPX=206055	SSHOW
*CPTS=207423	MAGSCA=206420	ST=207261
*CPTT=207425	*MAGSCATS=207440	-STAB
*CPTU=207422	*MAGSCAX=207441	-STAE
*CPTV=207424	*MAGSCAY=207442	STARTS=204400
CPWRAP=204454	MAGSCA2=206514	START76=205277
CPWRAPED=205224	MAGSCAEX=206513	-SUBR
CPWRAPX=204700	MAGSCA3=206530	*SUBR1
CPWRAPA=204535	*MAGSCAXS=207443	-SUMM
CPWRAPB=204560	*MAGSCAXE=207444	SUPPLINES
CPWRAPC=204564	*MAGSCAYS=207445	SUPPINS
CPWRAPBX=204563	*MAGSCAYE=207446	SUPPNUMS

IES OPLW 003

CPWRAPC1=204601	MAGSCA1=206461	SUPPTEXTS
CPWRAP1=204642	MAGSCA2X=206527	SVAL
CPWRAP2=204657	MAGSCA3X=206542	T
CPWRAP3=204665	MAGTPVAR=206056	*T1
CPWRAP2X=204662	MAGTXT=206267	*T2
CSP	MAGTPVX=206124	TEXTS
CSQ	*MAGTPX=207431	TEXTCNG
CURPICS	*MAGTPY=207432	TOPOS
CVAL	MAGTXTEX=206322	TPVAL
CVTS	*MAGTS=207447	TPVALS
DEADS	→MAKA	TRANSFORM=207106
DEGEN	MASBL	TRANSFORMX=207177
DEGEN1=205273	MASTERS	*TRANSFORMα=207453
DESIGS	→MASTER	TRANSFORMB=207115
→DIFF	MATD=200075	TRANS1=207126
→DIREC1	MATM=200071	TRANS2=207134
→DIREC	MATO=200072	TRANS4=207142
DISPLAY	MATRX=200073	TRANSFORMX1=207176
DISPLAYK	MATRY=200074	TUPLE
DRAWASFIX	MATS=200070	TVAL
ERRORSTOP	MERGERS	TXTS
→ERROR	MM0=022001	TYPE
→ERROR1	MM1=022007	UNIVBH
*EXLEVEL=207430	MM2=022015	V1=022251
*EXPAIRTS=207426	MM3=022023	V2=022275
*EXPAIRTT=207427	MM4=022031	V3=022321
EXPINS	MOVED	V4=022345
→FABVAL	→MOVE	V5=022371
FIX	→MOVEB	V6=022415
FIXEDS	→MOVEL	VA
FIXSAP	MOVINGDONE	VARIABLES
FREES	MOVIT	VARLOC
FREEDOMS	MOVINGS	VCON
GETIT	NAME	VFLW
→GORR	NCON	VORD
*GORREXIT	NDISP	WHERE
H1=022037	NEWCONS	WHERESCA=206364
H10=022147	NLIST	WHERESUB=207070
H2=022045	NTOSHO	WHERESCAX=206417
H3=022053	NUMBERS	WHERESUBX=207105
H4=022061	NVAL	WORKS
H5=022067	ONCIRCLES	*ZZLAST=207454
H6=022075	ONLINES	γ
H7=022103	OPSPL=205275	α
H8=022111	ORIGIN	Δ
H9=022117	OVERFLOWSTOP	ΔROT
		ΔSIZE
		β

```
------------------------------------------
           IES  OPLW  004
ARCTAN=*JPQ  CACT                                =540500200010
AFANG= LIST+CVAL@                                =     1024016
AFFB= LIST                                       =       24000
AFST= CMSTART                                    =      200022
AFCEN= CMCEN                                     =      200024
ATATAP= 2    **ATTACHER THING                    =           2

BASICFILE= 200033                                =      200033
BWHOS= 4     **TO WHICH PICTURE BLOCK BELONGS
                                                 =           4
BLOCKMAKER= 200052                               =      200052

CACT= 200007+1                                   =      200010
CVAL= 16     ** CIRCLE ANGLE AND RADIUS          =          16
CMSTART= 200022                                  =      200022
CMCEN= 200024                                    =      200024
CIRCEN= 14  ** CIRCLE CENTER                     =          14
CSQ=RFD *+1                                      =301200000001
CSP= 10      ** CIRCLE START POINT               =          10
CEP= 12      ** CIRCLE END POINT                 =          12
CMANG= 200026                                    =      200026
CIRCLES= 2*MASBL+PICTURES                        =       24225
CMAG= 200021                                     =      200021
CMNAME= 20002 0+10                               =      200030
CPNAME= 200054                                   =      200054
CONSTK= 3                                        =           3
CVTS= 6      ** VARIABLE TO MOVE TO SATISFY THIS
                                                 =           6
CONLET= 12  **CONSTRAINT LETTER CODE             =          12
CHVAR= 20    *** CHANGABLE VARIABLES             =          20
COMP= 16     **CONSTRAINT COMPUTATION ROUTINE
                                                 =          16
CURPICS= 15*SMASBL+LIST+1                        =       24117
CONSTRAINTS= 4*SMASBL+LIST+1                     =       24031
CCFR= LIST-2                                     =       23776

DRAWASFIX=SKM 4.9 377720                         =  1711377720
DISPLAY= 5  **MASTER DISPLAY SUBROUTINE =                    5
DEADS= 11*SMASBL+LIST+1                          =       24067
DISPLAYK= 2                                      =           2
DEGEN=*JMP  DEGEN1                               =400500205273
DESIGS= 13*SMASBL+LIST+1                         =       24103

ERRORSTOP=SKM 4.10 377731                        =  1712377731
EXPINS=SKM 4.10 EXPAIRTS **EXPANDING INSTANCE
                                                 =  1712207426

FREES= 5*SMASBL+LIST+1                           =       24037
FIX=SKM 4.10 377720                              =  1712377720
FIXSAP= 200064                                   =      200064
```

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-----------------------------------------------------------------

                    IES   OPLW   005
  FREEDOMS= 6*SMASBL+LIST+1                          =        24045
  FIXEDS= 17*SMASBL+LIST+1                           =        24075

  GETIT= 7      **MASTER FORMATION SUBROUTINE
                                                     =            7
  *CORREXIT= 0                                       =            0

  HOWBIG= 6     **MASTER SCSZ COMPUTATION            =            6
  HOVS= 15*MASBL+PICTURES                            =        24561
  HOVP1= 10     ** FIRST HORIZ OR VERT POINT
                                                     =           10
  HOVP2= 12     ** SECOND HOIIZ OR VERT POINT
                                                     =           12
  HOVCODE= 14 ** HORIZ=1, VERTICAL=2, EITHER=0
                                                     =           14
  HOLDERS= 2*SMASBL+LIST+1                           =        24015

  IWHAT= 14     ** WHAT PIC THIS IS INSTANCE OF
                                                     =           14
  INSTANCES= 6*MASBL+PICTURES                        =        24345
  ISIZE= 16     ** R                                 =           16
  IPCONS= 11*MASBL+PICTURES                          =        24441
  IPCP= 10      **POINT IN INSTANCE-POINT CONSTRAINT
                                                     =           10
  IPCI= 12      ** INSTANCE IN INSTANCE-POINT CONSTRAIN
                                T                    =           12
  IPCV= 14      ** VIRGIN POINT IN INSTANCE-POINT CONST
                                RAINT                =           14
  IP= LIST+IVAL+2                                    =        24022
  IVAL= 20      ** R COS a, R SIN a, X, Y            =           20
  IBVERTS= 14*MASBL+PICTURES                         =        24535
  IPCOTP= 16  ** INSTANCE-POINT CONSTRAINTS WITH THIS
                                VIRGIN               =           16
  IBVW= 10      ** WHICH INSTANCE IS VERTICAL
                                                     =           10
  IBVCODE= 12 ** INSTANCE TO BE VERTICAL, HORIZ, ETC
                                                     =           12

  JUNKK= 3                                           =            3

  KIND= 13      **1=NOT IN PIC, 2=PPART, 3=PICBLKS
                                                     =           13

  LIST= 24000 **LIST STRUCTURE START                 =        24000
  LSP= 10       **START OF LINE                      =           10
  LEP= 12       **END OF LINE                        =           12
  LINES= 1*MASBL+PICTURES                            =        24201
  LMSTART= 200022                                    =       200022
  LMEND= 200024                                      =       200024
  LMNAME= 200030                                     =       200030
```

```
                IES   OPLW   006
 LMAG= 200020                                =       200020
 LETMAG= 200015                              =       200015
*LGORR1=                                     =            6
*LGORR0=                                     =            2
*LGORREND=                                   =           14
*LGORR2=                                     =           13

 MASBL= 24    **MASTER BLOCK LENGTH          =           24
 MOVED=SKM 4.10 SCSZ                         =   1712200054
 MOVINGDONE=SKM 4.10 200061                  =   1712200061
 MOVIT= 10    **HOW TO MOVE COORDINATES      =           10
 MASTERS= LIST+1                             =        24001
 MERGERS= 10*SMASBL+LIST+1                   =        24061
 MOVINGS= 14*SMASBL+LIST+1                   =        24111

 NDISP= 200031                               =       200031
 NUMBERS= 10*MASBL+PICTURES                  =        24415
 NLIST= 22000                                =        22000
 NVAL= 16     ** R COS a, R SIN a, X, Y      =           16
 NTOSHO= 14   ** SCALER TO BE SHOWN          =           14
 NCON= 17     ** # CONSTRAINTS SHOWN         =           17
 NEWCONS= 16*SMASBL+LIST+1                   =        24125
 NAME= 4      **NAME OF HEADER BLOCKS        =            4

 ONCIRCLES= 13*MASBL+PICTURES                =        24511
 ORIGIN= 204400                              =       204400
 OVERFLOWSTOP=SKM 4.10 377731                =   1712377731
 ONLINES= 12*MASBL+PICTURES                  =        24465

 PICTURES= 22*SMASBL+LIST+1                  =        24155
 PLS= 14      ** LINES ND CIRCLES ON THIS POINT
                                             =           14
 PVAL= 20     ** COORDINATES OF POINT        =           20
 POINTS= 4*MASBL+PICTURES                    =        24275
 PSPL= 200042                                =       200042
 PNAME= 17    **NAME OF PICTURE, 36 BITS     =           17
 PSIZE= 16    **SIZE OF THIS PICTURE         =           16
 PPART= 4     **PICTURE PARTS                =            4
 PINS= 14     **INSTANCES OF THIS PICTURE    =           14
 PICCHANGE=SKM 4.10 CPNAME                   =   1712200054
 PSNEED=SKM 4.10 200041                      =   1712200041
 PYTHAGORIAN= 200007                         =       200007
 PSEUDO= 200041                              =       200041
 PMAG= 200017                                =       200017
 PPARTM= 10   **MOVING PICTURE PARTS         =           10
 PLOTIT=SKM 4.8 377621                       =   1710377621
 PLCLEAN= 200130                             =       200130
 PLPUNCH= 200132                             =       200132
 PLEND= 200133                               =       200133
 PUNCHIT=SKM 4.7 377621                      =   1707377621
```

```
--------------------------------------------------------------
              IES   OPLW   007
PLPUBUSY=SKM 4.10 200132                         = 1712200132
PLOTNOSCOPE=SKM 4.10 200130                      = 1712200130
PLPLOT= 200131                                   =     200131
PLPLBUSY=SKM 4.10 200131                         = 1712200131
PSAVE= 20    **6 REGISTERS TO SAVE IN PICTURE
                                                 =         20
PICBLKS= 2   **NON PICTURE STUFF IN PICTURE
                                                 =          2
PLOTBLOCKS= 200136                               =     200136
PLOTSTORAGE= 200137                              =     200137
PICTUREK= 1                                      =          1
PATAP= 12    **ATTACHERS OF THIS PICTURE =                 12
PBOCC= 10    ** CENTER OF POINT ON CIRCLE
                                                 =         10
PBOCS= 12    ** START OF POINT ON CIRCLE =                 12
PBOCP= 14    ** POINT TO BE ON CIRCLE            =         14
PBOLE= 10    ** END POINT OF LINE                =         10
PBOLS= 12    ** START OF POINT ON LINE           =         12
PBOLP= 14    ** POINT TO BE ON LINE              =         14
PWHOS= 6     **PICTURE IN PICTURES               =          6

RELAX= 200060                                    =     200060
READIT= 200066                                   =     200066


SMASBL= 6    **SMALL MASTER BLOCK LENGTH FOR DESIGNA
                            TERS                 =          6
SCSZ= 200034                                     =     200034
SQRT=*JPQ  200006                                =540500200006
SNDISP= 200032                                   =     200032
SCCEN= 200035                                    =     200035
S= 7                                             =          7
SPECB= 2     **SPECIFIC BLOCKS                   =          2
SCALERS= 3*MASBL+PICTURES                        =      24251
SPLAT=#-NLIST..#-NLIST                           =755777755777
SVAL= 16     ** VALUE OF SCALER                  =         16
SSHOW= 14    ** NUMBERS SHOWING THIS SCALER
                                                 =         14
SHOWBLKS=SKM 4.9 377725  **SHOW NON DRAW JUNK
                                                 = 1711377725
SHOWCON=SKM 4.8 377725   **SHOW CONSTRAINTS
                                                 = 1710377725
SHOWPOINTS=SKM 4.7 377725      **SHOW POINTS
                                                 = 1707377725
SHOWINSASBOX=SKM 4.6 377725    **ENBOX INSTANCES
                                                 = 1706377725
SUPPLINES=SKM 4.4 377725 **DON'T SHOW LINES AND CIR
                            CLES                 = 1704377725
SUPPINS=SKM 4.5 377725   **DON'T EXPAND INSTANCES
                                                 = 1705377725
SIZE= 11     **SIZE OF BLOCK                     =         11
```

```
--------------------------------------------------------------------

            IES   OPLW   010

 SPLATT=#-NLIST-SMASBL..#+ SMASBL-NLIST        =755773756005
 SPLATTT=#-NLIST-MASBL..#-NLIST+MASBL          =755753756023
 SUPPNUMS=SKM 4.2 SHOWTOG                      =  1702377725
 SHOWTOG= 377725                               =      377725
 SUPPTEXTS=SKM 4.3 SHOWTOG                     =  1703377725
 SHOWSCALERS=SKM 4.1 SHOWTOG                   =  1701377725
 SHOWTPVALS=SKM 3.9 SHOWTOG                    =  1771377725
*SUBR1=                                        =          16

 TYPE= 0      **TIES TO SPECB IN MASTER BLOCK
                                               =           0
 T= 10                                         =          10
 TEXTS= 7×MASBL+PICTURES                       =       24371
 TVAL= 14     ** R COS α, R SIN α, X, Y        =          14
 TXTS= 20     ** POINTER TO TEXT SHOWN         =          20
 TUPLE= 14    **# VARIABLES                    =          14
 TEXTCNG= 200077                               =      200077
 TPVAL= 14    **X,Y LOCATION                   =          14
 TOPOS= 3×SMASBL+LIST+1                        =       24023
 TPVALS= 5×MASBL+PICTURES **TYPICAL VARIABLES
                                               =       24321
*T1=                                           =           5
*T2=                                           =           3

 UNIVBH= SMASBL,4,,MASTERS-LIST                =  6004000001

 VCON= 12     ** CONSTRAINTS ON THIS VARIABLE
                                               =          12
 VA= LIST+PVAL                                 =       24020
 VORD= 6      **ORDERING OF VARIABLES          =           6
 VFLW= 10     ** CONSTRAINTS WHICH THIS VARIABLE IS T
                          O SATISFY            =          10
 VARLOC= 15   **LOCATION OF VARIABLES IN BLOCK
                                               =          15
 VARIABLES= 1×SMASBL+LIST+1                    =       24007

 WORKS= 7×SMASBL+LIST+1                        =       24053
 WHERE= 12    **LOCATION OF THING IN PICTURE
                                               =          12

 γ= 3                                          =           3

 α= 1                                          =           1

 Δ= 4                                          =           4
 ΔSIZE= 200055        **KNOB CHANGE            =      200055
 ΔROT= 200056         **KNOB CHANGE            =      200056

 β= 2                                          =           2
```

```
-----------------------------------------

              IES   OPLW   012

--DEF  MOVE1A→B
*LDE A
STE B
--EMD

--DEF  HDIF1P,Q→R
LDA P
SUB Q
SCA {-1,-1,.,-1,-1}+((Q)^(7 70,))
STA R
--EMD

--DEF  DIFF≡P→Q=R→S
LDA P
SUB Q
*JOV S
STA R
--EMD

--DEF  FABVAL≡P→Q
LDA P
JPA *+2
COM A
STA Q
--EMD

--DEF  PYTH1≡P→Q,R→S=T→U
LDA R
SUB S
*JOV U+(S)-(S)
STA B+(R)-(R)
LDA P
SUB Q
*JOV U+(Q)-(Q)
*JPQ PYTHAGORIAN
*JOV U
STA T
--EMD

--DEF  PYTH≡P→Q=T→U
PYTH1≡P→Q,P+1→Q+1=T→U
--EMD

--DEF  DIREC1≡P→Q,R→S=T→U
LDA R
SUB S
*JOV U+(S)-(S)
STA B+(R)-(R)
LDA P
SUB Q
```

IES OPLW 013

```
*JOV U+(Q) -(Q)
*JPQ CACT
STA T
--EMD

--DEF DIREC≡P→Q=T→U
DIREC1≡P→Q.P+1→Q+1=T→U
--EMD

--DEF ROTA≡σ→G
LDAσVA
LDBσVA+1
*JPQ ROTATER
STA G
STB G+1
--EMD

--DEF HSUM≡P.Q→R
LDA P
ADD Q
SCA {-1,-1,,-1,-1}+((Q)∧(7 70,))
STA R
--EMD

--DEF SUMM≡P→Q=R→S
LDA P
ADD Q
*JOV S
STA R
--EMD

--DEF PROD≡A×B/C=D→E
LDA A
MUL B
DIV C
*JOV E
STA D
--EMD

--DEF LDAE≡A.B.C.D
LDA A
LDB A+B
LDC A+C
LDD A+D
--EMD

--DEF STAE≡A.B.C.D
STA A
STB A+B
STC A+C
```

IES OPLW 014

```
STD A+D
-- EMD

-- DEF  HEADxα→B
16RSXB |αLIST
INXB |α
-- EMD

-- DEF  MOVEB|AxB→CxD
T1 =A
T2 =C
SKNT1B
SUZT2D
MKNT2D
-- EMD

-- DEF  GORR≡Axα=B→B→C
1DPXαT2+(C)-(C)
INXαA+1
JPQ T1+(C) -(C)
T2→     REXα0+(C) - (C)
JPQ C
T1→     RSXα|αLIST
16RSXB |αLIST-1
INXB |α0
DEXB1
*LDEαLIST-1
1SED {0}
JPQ T2+(C) -(C)
*JPQ B
JPQ T1+(C) -(C)
-- EMD

-- DEF  LDAB≡A
LDA A
LDB A+1
-- EMD

-- DEF  STAB≡P
STA P
STB P+1
-- EMD

-- DEF  ERROR≡α→P
*JPQ {ERROR1≡α→P}
-- EMD

-- DEF  ERROR1≡α→P
1STE *+2
SKZ ERRORSTOP
```

-- 68

IES OPLW 015

```
1#a
JPQ P
--EMD

--DEF  PUTNAME≡a→LMNAME
SKZ EXPINS     **WORKING IN INST?
JPQ #+6
DPX a A
CYA {10..}
20 CYA {0..-12000}
ITA {377..377}
STA LMNAME
--EMD

--DEF  MAKA≡A→I
REX a A-LIST
*JPQ BLOCKMAKER
REX I|a
--EMD

--DEF  COMB≡A→B×a
1RSX S|a A+LIST+1
SXD S|a A+1
JPQ #+14
REX S|a B+1
2RSX T|a A+LIST+1
1DPX S|T LIST
2EXX T|S LIST
1RSX S|a LIST+A+1
2DPX T|S LIST
1DPX S|T LIST
REX S|a A+1
*DPX S E
*2 DPX S E
STE S LIST
--EMD

--DEF  LGORR≡N×XR=XR2→SUBR→LEXIT
GORREXIT=LEXIT
1DPX XR LGORR1
11RSX XR2|XR LIST+(N)+1
LGORR0→        16RSX XR|XR2 LIST-1
*-1 JNX XR #+2
1SKX XR 1
INX XR|XR2 0
LGORR1→        SXD XR #  **MODIFIED
*JPQ GORREXIT+(GORREXIT/GORREXIT⊘1×(LGORREND+1))
11RSX XR2|XR2 LIST
1DPX XR2 LGORR2
*JPQ SUBR
```

```
------------------------------------------------------------
                    IES   OPLW   016
LGORR2-        SKXXR2#        **MODIFIED
LGORREND-      JPQ LGORR0
--EMD

--DEF  PUTL≡N×XR→M×XR2
12AUXXR{(N)+1..-((N)+1)}
12RSXS|XR2LIST+(M)+1
2DPXS|XRLIST
11RSXT|SLIST
1DPXT|XRLIST
      2DPXXR|TLIST
      1DPXXR|SLIST
11RSXS|XR2LIST+(M)
*JPXS#+2
SKXS|XR20
1DPXS|XRLIST-1
11AUXXR{(N)+1..-((N)+1)}
--EMD

--DEF  PUTR≡N×XR→M×XR2
12AUXXR{(N)+1..-((N)+1)}
11RSXS|XR2LIST+(M)+1
1DPXS|XRLIST
12RSXT|SLIST
2DPXT|XRLIST
      2DPXXR|SLIST
      1DPXXR|TLIST
11RSXS|XR2LIST+(M)
*JPXS#+2
SKXS|XR20
1DPXS|XRLIST-1
11AUXXR{(N)+1..-((N)+1)}
--EMD

--DEF  LTAKE≡N×XR
12RSXS|XRLIST+(N)+1
11RSXT|XRLIST+(N)+1
1DPXT|SLIST
2EXXS|TLIST
1DPXS|XRLIST+(N)+1
2DPXS|XRLIST+(N)+1
1DPX0|XRLIST+(N)
--EMD

--DEF  SUBR≡A
    1STE SUBR1
    A
SUBR1- JPQ #
--EMD
```

```
---------------------------------------------------------
                IES   OPLW   017
 ▾▾DEF  HEADER≡T→N→P
        T1 =P
        SMASBL.4..T-LIST
        #-NLIST-SMASBL..#+SMASBL-NLIST
        -2.0
        SPLAT
        N
        T1
 ▾▾EMD

 ▾▾DEF  MASTER≡T→N
        MASBL.4..T-LIST
        #-NLIST-MASBL..#-NLIST+MASBL
        -2.
        SPLAT
        N
 ▾▾EMD

 ▾▾DEF  α⊟A.β
        RSXα|βLIST+A
 ▾▾EMD

 ▾▾DEF  MOVEL≡N×XR→M×XR2
 12RSXS|XRLIST+(N)+1**TAKE
 11RSXT|XRLIST+(N)+1
 1DPXT|SLIST
 2EXXS|TLIST
 1DPXS|XRLIST+(N)+1
 2EXXS|XR2LIST+(M)+1**PUT
 2DPXS|XRLIST+(N)+1
 11RSXT|SLIST
 1EXXT|XRLIST+(N)+1
 1DPXT|SLIST
 ▾▾EMD

 ▾▾DEF  SKIE≡N×α
        RSXT|αLIST+N+1
        *11LDETLIST
        SXDT*E
        JPQ #+2
 ▾▾EMD
```

```
----------------------------------------------------------------

                 IES   OPLW   020

 200067|
        JPQ   STARTS                      |140500 204400|   067

 200070|
 MATS-    0                               |000000 000000|200070
 MATM-    0                               |000000 000000|   071
 MATO-    0                               |000000 000000|   072
 MATRX-   0                               |000000 000000|   073
 MATRY-   0                               |000000 000000|   074
 MATD-    0                               |000000 000000|   075

 200100|
 BADOV-  *1STE *+2                        |413000 200102|200100
        *SKZ   OVERFLOWSTOP               |601712 377731|   101
        2#76                              |020076 200102|   102
        JPQ   200001                      |140500 200001|   103

 CCFR+1|
        *JMP   MAGCON                     |400500 206125|   777

 NLIST|
        HOVS-LIST+MASBL                   |000000 000605|022000
 MM0-   SMASBL.4..0**MASTERS              |006004 000000|   001
        SPLAT                             |000002 000002|   002
        -2.                               |775000 000000|   003
        MM4-NLIST+1..MM1-NLIST+1          |000032 000010|   004
        45.30..35.44          **UNIV      |045030 035044|   005
        0                                 |000000 000000|   006
 MM1-   UNIVBH        **VARIABLES         |006004 000001|   007
        MM0-NLIST+SPECB+1..SPLATT         |000004 000016|022010
        -2.                               |775000 000000|   011
        V6-NLIST+1..V1-NLIST+1            |000416 000252|   012
        42.41..20.45          **VARS      |042041 020045|   013
        0                                 |000000 000000|   014
 MM2-   UNIVBH        **HOLDERS           |006004 000001|   015
        SPLATT                            |000010 000024|   016
        -2.                               |775000 000000|   017
        H10-NLIST+1..H1-NLIST+1           |000150 000040|022020
        42.23..33.27          **HLDS      |042023 033027|   021
        0                                 |000000 000000|   022
 MM3-   UNIVBH        **TOPOS             |006004 000001|   023
        SPLATT                            |000016 000032|   024
        -2.                               |775000 000000|   025
        L3-NLIST+1..L1-NLIST+1            |000226 000156|   026
        36.37..36.43          **TOPO      |036037 036043|   027
        0                                 |000000 000000|022030
 MM4-   UNIVBH        **CONSTRAINTS       |006004 000001|   031
        #-NLIST-SMASBL..MM0-NLIST+SPECB+1
                                          |000024 000004|   032
        -2.                               |775000 000000|   033
        IPCONS-LIST+1..ONLINES-LIST+1
                                          |000442 000466|   034
        42.35..36.20                      |042035 036020|   035
        0                                 |000000 000000|   036
```

72

```
IES   OPLW   021
H1→  SMASBL.4..MM2-NLIST           **FREES ✓
                                    |006004 000015|        037
     MM2+SPECB+1-NLIST..SPLATT      |000020 000046|022040
                                    |775000 000000|        041
     -2.
                                    |000042 000042|        042
     SPLAT
                                    |024024 041025|        043
     24.24..41.25
                                    |000000 000000|        044
     0
H2→  HEADER≡HOLDERS→(34.23..41.25)     **FREEDOM ✓
     SMASBL.4..HOLDERS-LIST         |006004 000015|        045
     #-NLIST-SMASBL..#+SMASBL-NLIST
                                    |000040 000054|        046
                                    |775000 000000|        047
     -2.0
                                    |000050 000050|022050
     SPLAT
                                    |034023 041025|        051
     (34.23..41.25)
                                    |000000 000000|        052
     T1
H3→  HEADER≡HOLDERS→(42.32..41.46)     **WORKS ✓
     SMASBL.4..HOLDERS-LIST         |006004 000015|        053
     #-NLIST-SMASBL..#+SMASBL-NLIST
                                    |000046 000062|        054
                                    |775000 000000|        055
     -2.0
                                    |000056 000056|        056
     SPLAT
                                    |042032 041046|        057
     (42.32..41.46)
                                    |000000 000000|022060
     T1
H4→  HEADER≡HOLDERS→(41.26..41.34)     **MRGR ✓
     SMASBL.4..HOLDERS-LIST         |006004 000015|        061
     #-NLIST-SMASBL..#+SMASBL-NLIST
                                    |000054 000070|        062
                                    |775000 000000|        063
     -2.0
                                    |000064 000064|        064
     SPLAT
                                    |041026 041034|        065
     (41.26..41.34)
                                    |000000 000000|        066
     T1
H5→  HEADER≡HOLDERS→(42.23..24.23)     **DEADS ✓
     SMASBL.4..HOLDERS-LIST         |006004 000015|        067
     #-NLIST-SMASBL..#+SMASBL-NLIST
                                    |000062 000076|022070
                                    |775000 000000|        071
     -2.0
                                    |000072 000072|        072
     SPLAT
                                    |042023 024023|        073
     (42.23..24.23)
                                    |000000 000000|        074
     T1
H6→  HEADER≡HOLDERS→(42.47..30.25)     **FIXED ✓
     SMASBL.4..HOLDERS-LIST         |006004 000015|        075
     #-NLIST-SMASBL..#+SMASBL-NLIST
                                    |000070 000104|        076
                                    |775000 000000|        077
     -2.0
                                    |000100 000100|022100
     SPLAT
                                    |042047 030025|        101
     (42.47..30.25)
                                    |000000 000000|        102
     T1
H7→  HEADER≡HOLDERS→(42.26..24.23)     **DEISGS ✓
     SMASBL.4..HOLDERS-LIST         |006004 000015|        103
     #-NLIST-SMASBL..#+SMASBL-NLIST
                                    |000076 000112|        104
```

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--------------------------------------------------------------

              IES    OPLW    022
        -2.0                                |775000 000000|     105
         SPLAT                              |000106 000106|     106
        (42,26,,24,23)                      |042026 024023|     107
         T1                                 |000000 000000|022110
H8→     HEADER≡HOLDERS→(42,35,,45,34)      **MOVINGS
         SMASBL.4..HOLDERS-LIST             |006004 000015|     111
        #-NLIST-SMASBL..#+SMASBL-NLIST
                                            |000104 000120|     112
        -2.0                                |775000 000000|     113
         SPLAT                              |000114 000114|     114
        (42,35,,45,34)                      |042035 045034|     115
         T1                                 |000000 000000|     116
H9→     HEADER≡HOLDERS→(22,37,,44,22)      **CURPICS
         SMASBL.4..HOLDERS-LIST             |006004 000015|     117
        #-NLIST-SMASBL..#+SMASBL-NLIST
                                            |000112 000126|022120
        -2.0                                |775000 000000|     121
         SPLAT                              |000122 000122|     122
        (22,37,,44,22)                      |022037 044022|     123
         T1                                 |000000 000000|     124
H8.1→   HEADER≡HOLDERS→(35,22,,47,35)
         SMASBL.4..HOLDERS-LIST             |006004 000015|     125
        #-NLIST-SMASBL..#+SMASBL-NLIST
  ?                                         |000120 000134|     126
        -2.0          NCXN                  |775000 000000|     127
         SPLAT                              |000130 000130|022130
        (35,22,,47,35)                      |035022 047035|     131
         T1                                 |000000 000000|     132
H9.2→   HEADER≡HOLDERS→(1,41,,37,42)
         SMASBL.4..HOLDERS-LIST             |006004 000015|     133
        #-NLIST-SMASBL..#+SMASBL-NLIST
                                            |000126 000142|     134
        -2.0                                |775000 000000|     135
         SPLAT                              |000136 000136|     136
        (1,41,,37,42)                       |001041 037042|     137
         T1                                 |000000 000000|022140
H8.3→   HEADER≡HOLDERS→(2,41,,37,42)
         SMASBL.4..HOLDERS-LIST             |006004 000015|     141
        #-NLIST-SMASBL..#+SMASBL-NLIST
                                            |000134 000150|     142
        -2.0                                |775000 000000|     143
         SPLAT                              |000144 000144|     144
        (2,41,,37,42)                       |002041 037042|     145
         T1                                 |000000 000000|     146
H10→     SMASBL.4..MM2-NLIST                |006004 000015|     147
        #-NLIST-SMASBL..MM2-NLIST+SPECB+1
                                            |000142 000020|022150
        -2.                                 |775000 000000|     151
         SPLAT                              |000152 000152|     152
                                            [illegible]
```

```
------------------------------------------------------------------
            IES   OPLW    023
                                        |000000 000000|    154
      0
     **PICTURE MASTER
                                        |024004 000023|    155
L1-   MASBL.4..TOPOS-LIST
      MM3+SPECB+1-NLIST..SPLATTT
                                        |000026 000202|    156
                                        |775000 000000|    157
      -2.
                                        |000160 000160|022160
      SPLAT
      42.22..30.37        **NAME        |042022 030037|    161
     *JPQ   MAGPIC**DISPLAY             |540500 205663|    162
                                        |000000 000000|    163
      0    .**HOWBIG
                                        |000000 000000|    164
      0     **GETIT
                                        |000000 000000|    165
      0     **MOVIT
                                        |030016 000000|    166
      30.16..0    **SIZE
                                        |000000 000000|    167
      0
                                        |000000 000001|022170
Q1-   PICTUREK    **KIND
                                        |000000 000000|    171
      0     **TUPLE
                                        |000000 000000|    172
      0     **VARLOC
 LINES+NLIST-LIST1
     **LINE  MASTER
L2-  MASTER=TOPOS-(24.35..30.33)
      MASBL.4..TOPOS-LIST               |024004 000023|    201
     #-NLIST-MASBL..#-NLIST+MASBL
                                        |000156 000226|    202
                                        |775000 000000|    203
     -2.
                                        |000204 000204|    204
      SPLAT
                                        |024035 030033|    205
     (24.35..30.33)
     *JMP   MAGL    **DISPLAY           |400500 205736|    206
     *JMP   CPIL    **HOWBIG            |400500 204707|    207
                                        |000000 000000|022210
      0     **GETIT
                                        |400500 205273|    211
      DEGEN         **MOVIT
                                        |014014 000000|    212
      14.14..0      **SIZE
                                        |000000 000000|    213
      0
                                        |000000 000002|    214
Q2-   DISPLAYK
                                        |000000 000000|    215
      0     **TUPLE
                                        |000000 000000|    216
      0     **VARLOC
 CIRCLES+NLIST-LIST1
     **CIRCLE MASTER
                                        |024004 000023|    225
L3-   MASBL.4..TOPOS-LIST
     #-NLIST-MASBL..MM3+ SPECB+1-NLIST
                                        |000203 000026|    226
                                        |775000 000000|    227
     -2.
                                        |000230 000230|022230
      SPLAT
      22.41..30.22          **CIRC      |022041 030022|    231
     *JMP   MAGC    **DISPLAY           |400500 205770|    232
     *JMP   CPIC    **HOWBIG            |400500 204723|    233
                                        |000000 000000|    234
      0     **GETIT
                                        |400500 205273|    235
      DEGEN         **MOVIT
                                        |020016 000000|    236
      20.16..0      **SIZE
                                        |000000 000000|    237
      0
                                        |000000 000002|022240
Q3-   DISPLAYK
```

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----------------------------------------------

              IES    OPLW    024
      0       ** TUPLE                 |000000 000000|     241
      0       ** VARLOC                |000000 000000|     242
  SCALERS+NLIST-LISTI
      **SCALER MASTER
 V1-    MASBL.4..VARIABLES-LIST        |024004 000007|     251
        MM1+SPECB+1-NLIST..SPLATTT
                                       |000012 000276|     252
      -2.                              |775000 000000|     253
        SPLAT                          |000254 000254|     254
        33.20..22.42        ** SCAL    |033020 022042|     255
      *JMP   MAGSCA**DISPLAY           |400500 206420|     256
        DEGEN        ** HOWBIG         |400500 205273|     257
        0       ** GETIT               |000000 000000|022260
      *JMP   TRANSFORM      ** MOVIT   |400500 207106|     261
        20.16..0     ** SIZE           |020016 000000|     262
      *JMP   WHERESCA       ** WHERE   |400500 206364|     263
 Q7-    JUNKK                          |000000 000003|     264
        1       ** TUPLE               |000000 000001|     265
        SVAL ** VARLOC                 |000000 000016|     266
 POINTS+NLIST-LISTI
      **POINT MASTER
 V2-  MASTER≡VARIABLES-(42.43..35.37)
        MASBL.4..VARIABLES-LIST        |024004 000007|     275
      #-NLIST-MASBL..#-NLIST+MASBL
                                       |000252 000322|     276
      -2.                              |775000 000000|     277
        SPLAT                          |000300 000300|022300
      (42.43..35.37)                   |042043 035037|     301
      *JMP   MAGP   ** DISPLAY         |400500 206035|     302
      *JMP   CPIP   ** HOWBIG          |400500 204701|     303
        0       ** GETIT               |000000 000000|     304
      *JMP   TRANSFORM      ** MOVIT   |400500 207106|     305
        22.20..0     ** SIZE           |022020 000000|     306
      *JMP   WHERESUB       ** WHERE   |400500 207070|     307
 Q4-    JUNKK                          |000000 000003|022310
        2       ** TUPLE               |000000 000002|     311
        PVAL ** VARLOC                 |000000 000020|     312
 TPVALS-LIST+NLISTI
      **TYPICAL VARIABLE  *
 V3-  MASTER≡VARIABLES-(41.45..37.43)
        MASBL.4..VARIABLES-LIST        |024004 000007|     321
      #-NLIST-MASBL..#-NLIST+MASBL
                                       |000276 000346|     322
      -2.                              |775000 000000|     323
        SPLAT                          |000324 000324|     324
      (41.45..37.43)                   |041045 037043|     325
      *JMP   MAGTPVAR       ** DISPLAY
                                       |400500 206056|     326
        DEGEN        ** HOWBIG         |400500 205273|     327
        0       ** GETIT               |000000 000000|022330
```

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              IES   OPLW    025
       *JMP  TRANSFORM        **MOVIT |400500 207106|   331
                                       |016014 000000|   332
        16,14,,0     **SIZE
       *JMP  WHERESUB         **WHERE |400500 207070|   333
                                       |000000 000003|   334
Q14->   JUNKK
                                       |000000 000002|   335
        2       **TUPLE
                                       |000000 000014|   336
        TPVAL           **VARLOC
 INSTANCES+NLIST-LISTI
       **INSTANCE MASTER
V4->   MASTER≡VARIABLES->(43,42,,35,30)
        MASBL,4,,VARIABLES-LIST        |024004 000007|   345
       #-NLIST-MASBL,,#-NLIST+MASBL
                                       |000322 000372|   346
                                       |775000 000000|   347
        -2.
                                       |000350 000350|022350
        SPLAT
                                       |043042 035030|   351
        (43,42,,35,30)
       *JMP  MAGI   **DISPLAY          |400500 206543|   352
       *JMP  CPII   **HOWBIG           |400500 205050|   353
                                       |000000 000000|   354
        0       **GETIT
       *JMP  TRANSFORM        **MOVIT |400500 207106|   355
                                       |024016 000000|   356
        24,16,,0     **SIZE
       *JMP  WHERESUB         **WHERE |400500 207070|   357
                                       |000000 000002|022360
Q5->    DISPLAYK
                                       |000000 000004|   361
        4       **TUPLE
                                       |000000 000020|   362
        IVAL **VARLOC
 TEXTS+NLIST-LISTI
       **TEXT MASTER
V5->   MASTER≡VARIABLES->(43,47,,24,43)
        MASBL,4,,VARIABLES-LIST        |024004 000007|   371
       #-NLIST-MASBL,,#-NLIST+MASBL
                                       |000346 000416|   372
                                       |775000 000000|   373
        -2.
                                       |000374 000374|   374
        SPLAT
                                       |043047 024043|   375
        (43,47,,24,43)
       *JMP  MAGTXT**DISPLAY           |400500 206267|   376
       *JMP  CPITXT**HOWBIG            |400500 205136|   377
                                       |000000 000000|022400
        0       **GETIT
       *JMP  TRANSFORM        **MOVIT |400500 207106|   401
                                       |032014 000000|   402
        32,14,,0     **SIZE
       *JMP  WHERESUB         **WHERE |400500 207070|   403
                                       |000000 000002|   404
Q8->    DISPLAYK
                                       |000000 000004|   405
        4       **TUPLE
                                       |000000 000014|   406
        TVAL **VARLOC
 NUMBERS+NLIST-LISTI
       **NUMBER MASTER
V6->    MASBL,4,,VARIABLES-LIST        |024004 000007|   415
       #-NLIST-MASBL,,MM1+ SPECB+1-NLIST
                                       |000372 000012|   416
                                       |775000 000000|   417
        -2.
                                       |000420 000420|022420
        SPLAT
        (21,34,,44,35)        **NUMB   |021034 044035|   421
```

```
                IES    OPLW     026
        *JMP   MAGNUM**DISPLAY              |400500 206323|      422
        *JMP   CPINUM**HOWBIG               |400500 205100|      423
         0     **GETIT                      |000000 000000|      424
        *JMP   TRANSFORM       **MOVIT      |400500 207106|      425
         22,16,,0      **SIZE               |022016 000000|      426
        *JMP   WHERESUB        **WHERE      |400500 207070|      427
0 -      DISPLAYK                           |000000 000002|022430
         4     **TUPLE                      |000000 000004|      431
         NVAL  **VARLOC                     |000000 000016|      432
ORIGINI
```

FULL TEXT

SEP 21 1962 LMH GX7A 001 #26, 31

45B=016530	HOLDERS	SIX=015276
45COMMON=016122	HOVCODE	SIZE
45CURRENT=200125	HOVP1	SMASBL
-45DELAY	HOVP2	SPACE=015220
*45DELAYEX	HOVS	*SPD1
*45DELAYK	HOWBIG	*SPD2
45DORWD=016436	I15=200015	*SPD3
45ENDBLK=016154	IBVCODE	*SPD4
45ERR=016504	IBVERTS	SPECB
45ERRMSG=016321	IBVW	-SQ45DELAY
45ERRSTOP=016520	II=015502	SS=015656
45EXIT=016606	INSTANCES	SSHOW
45FREE=016736	*IOACONTB	ST=017275
45FREEX=016756	*IOANOTSCHB	-STAB
45GARBSW	*IOASCHB	-STAE
45GARB=016007	*IOASCHSWB	STARTS=014400
45GFR	-IOAB	-SUMCHKCMP
45GF	IPCI	-SUMM
45GFW	IPCONS	SVAL
45GO=016025	IPCOTP	T
45GO2=016045	IPCP	TA
45IT1=016457	IPCV	*TAF0R
45IT3=016467	ISIZE	*TAF0F
45IT2=016463	IVAL	*TAF0FΔ
45LAST INSTR=016776	IWHAT	*TAF1F
45LIST	JJ=015513	*TAF1R
45LPSW	KA	*TAF2F
45LW	KEYSTART=014403	*TAF2R
45LWRET=016315	KEYTAB=014426	*TAF3R
45M2=016217	KIND	*TAF3F
45M2A=016223	KK=015524	*TAF4F
45M3=016224	LAST=017276	*TAF4R
45M3A=016237	-LDAE	*TAFBL
45M4=016240	*LENTRYB	*TAFCON
45M5=016246	LEP	*TAFCOMP
45M6=016250	*LETCNT=020340	*TAFDKF
45M6A=016257	LETDISLAST=015212	*TAFDKR
45M7=016271	LETDIS=015132	*TAFERRSW
45M8=016304	LETDIS1=015144	*TAFERR
45MCA1=016540	LETMAG=014762	*TAFERREXIT
45MCA3=016551	LETMAGINT=014776	*TAFFOR
45MCA2=016543	LETMAGEX=015073	*TAFGOFWD
45MERGE=016531	LETMON=015036	-TAFIOAΔ
45MERGE2=016557	LETMAG1=015022	*TAFIOS
45MG3=016607	LETMAG2X=015072	*TAFIOASTARTB
45MG3X=016627	LETMAG2=015046	*TAFIOAIOSB
45MG4=016630	LETMAG3=015074	*TAFIOSRET
45MG4X=016634	LETMAG2L=015070	*TAFLVREV
45MG5A=016656	LETMAG2C=015064	*TAFNOTREADY

LMH GX7A 002

45MG5=016655	LETMAG3X=015131	*TAFNEGMK
45MG5X=016675	*LETS=020341	*TAFREVDIR
45MG6=016676	LETTER=015217	*TAFREV
45MG6X=016702	*LETT=020342	*TAFREVSW
45MG7=016732	*LETΔ=020337	*TAFSCHK
45MK1=016206	*LGORR	*TAFST
45MK2=016212	*LGORL	*TAFSPCK
45MSG=016177	*LGORRI	*TAFSTK
45MWA3=016527	*LGORLI	*TAFWAI
45MW=016521	*LGORR1	*TAPEK4
45MWA=016523	*LGORR0	*TAPEK3
45MWA2=016526	*LGORREND	*TAPEK2
45NORMSG=016263	*LGORR2	*TAPEK1
45NSW	LINES	TEXTS
45NUM	*LIOAMSGB	TEXTMAG=014526
45PREXIT=016161	LIST	TEXTCNG=014446
45PUT=016757	LIST2=016535	*TEXTPLACE=020352
45PUTX=016775	LL=015535	TEXTCNGEX=014470
45REV	LMAG	TEXTCNG1=014471
45REVSW	LMEND	TEXTCNGX=014475
45READ=016105	LMSTART	TEXTMAGEX=014610
45RESETIT=016447	*LPAREN=020343	*TEXT=020353
45RWD	LSP	TEXTMAG1=014560
45RWSW	*LSWB	TEXTMAG1T=014612
45RW?=016103	*LTAKE	TEXTMAG1A=014564
45RWDEXIT=016446	*LXSETB	*TEXTINDEX=020354
45SCHFWD=016060	MASBL	TEXTMAG1B=014604
45SCHBWD=016357	MASTERS	TEXTMAG1X=014605
45SC=016405	MERGERS	THREE=015243
45SC2=016416	META	TL
45SF1=016061	MINUS=015763	TOPOS
45SF1A=016067	MM=015543	*TPKB
45SF2=016074	*MOVE	TPVAL
45SRM	*MOVEL	TPVALS
45SR=015777	*MOVER	TR
45SRN=015774	MOVIT	TT=015664
45SRGARB=016002	MOVINGS	TUPLE
45SR1=016362	*MTLOOPB	*TURNOFFΔ
45SR2=016370	NAME	TVAL
45STM	NCON	TWO=015232
45START	*NENTRYB	TX2ISTRD=017212
45SWITCHES=016455	NEWCONS	TX2EMERR=017174
45SW=016017	*NEWH	TX2DATA=017203
45SWN=016014	*NEWH1	TX2ERR=017110
45SWITCHRINGS=016734	*NEWH2	TX2GBM=017177
45TC1=016474	NINE=015326	TX2IK
45TSD=016143	NLIST	TX2K1=017011
*45TYPE=020336	NN=015557	TX2K2=017064
45TYPECHK=016473	*NORMENTRYB	TX2MSW=016314
45TYPECHKX=016502	*NORMEXITB	TX2MSW2=016260

45W2=016342	*NRCOS=020344	TX2MSG=017047
45WA2	*NRSIN=020345	TX2NAME
45WA=016456	*NTFENTRYB	TX2RD=017127
45WCS	*NTFNDMSGB	TX2RESET=017113
45WR=016332	NTOSHO	TX2RESETX=017123
45X	NUMBERS	TX2RDLOOP=017150
45X2	*NUMBER=020346	TX2RD1=017164
45ZSW	NUMMAG=014616	TX2RD3=017237
*46LW	NUMMAGEX=014761	TX2RDCONT=017234
AA=015353	NUMMON=014674	TX2RD2=017215
*ALLERRSB	NUMMAG1=014654	TX2RD4=017250
ATATAP	NUMMON1=014730	TX2RD3A=017242
BADOV	NUMMON2=014753 ←	TX2RD3B=017243
BB=015364	*NUMTT=020347	TX2SCOPE=017074
BL	*NUMTS=020350	TX2SCOPEX=017107
BLOCK MARK	NVAL	TX2SCOPERET=017120
*BMCHK	ONCIRCLES	TX2ST=017211
*BMENTRYB	ONE=015221	TX2TOG
*BMERR	ONLINES	TX2TOGCHK=017264
BR	OO=015570	TX2WR=016777
BWHOS	ORIGIN	TX2WA3=017126
CC=015406	PATAP	TX2WA1=017124
CEP	PBOCC	TX2WA2=017125
-CHGRR	PBOCS	TXCG1=014502
-CHGRL	PBOCP	TXCGBAC=014523
CHVAR	PBOLE	TXCGNO=014524
CIRCLES	PBOLS	TXCG2=014506
CIRCEN	PBOLP	TXCG3=014516
CL=017274	PICBLKS	TXTS
CMAG	PICTURES	TYPE
CMANG	PINS	-TYPEN
*CMP1	PLS	-TYPEL
CMA	PLUS=015755	-TYPEB
CMB	PNAME	TYPESTART=014416
-COMBL	POINTS	*TYPEXITB
-COMBR	PP=015604	*TYPECNTRB
-COMBHR	PPART	*TYPELOOPB
-COMBHL	PPARTM	UU=015672
COMMA=015771	-PROD	VARIABLES
COMP	PSAVE	VARLOC
CONLET	PSIZE	VCON
CONSTRAINTS	-PUTL	VFLW
CSP	-PUTLQ	VORD
CSQ	-PUTR	VV=015703
CURPICS	-PUTRQ	WHERE
CVAL	PVAL	WIBM=200122
CVTS	PWHOS	WIBMN=200123
DD=015417	QQ=015620	WORKS
DEADS	RCOS=015213	-WR2A
DESIGS	RDTX2=200126	*WRCONT

LMH GX7A 004

```
-DIFF
 DISPLAY
 DOT=015766
 EE=015425
*EIAFNDB
*EIALOOPB
*EIALDB
 EIGHT=015320
*ELOOPMSG1B
*ELOOPMSG2B
*EOTCHK
*ERR
-ERRLOOPB
*ERRS
*ERRTABLEKB
*ERRTABLEB
-FABVAL
 FF=015441
*FIOAMSGB
 FIVE=015265
 FIXEDS
 FOUR=015254
 FREES
 FREEDOMS
 GETBLOCKÊR
 GETIT
 GG=015452
*GOODBM
*GORREXIT
 HH=015471
*REV
 RGARB=200124
 RI=017273
 RIBM=200120
 RIBMN=200121
*RL
*RM
*RPAREN=020351
 RR=015637
 RSIN=015214
 S
*SCADD
 SCALERS
 SCCEN
*SCDATA
*SCEBMEB
*SCENTRYB
-SCF2Δ
-SCFΔ
*SCHENTRY
-SCR2Δ
*SCRAST
*SCRENTRY
*SCRET
*SCRL
*SCRM
-SCRΔ
 SCSZ
-SEARCHΔ
 SEVEN=015307
*WRELOOP
*WRENTRY
*WRESW
*WRLBM
*WRLD
*WRMAINLOOP
*WRSC
*WRSPB
*WRSPL
 WRTX2=200127
-WRΔ
 WW=015711
*XCHKSW
*XCHK
 XPOS=015215
*XSETKB
*XSETB
 XX=015725
*XXX
*XXXB
 YPOS=015216
 YY=015733
 ZERO=015337
 ZZ=015744
*ZZLAST=020355
 Y
 ?
 α
 ε
 B
```

```
45X= 45                                        =          43
45X2= 44                                       =          44
45RWD='IOS 45 30010      **LOW DENSITY ODD PARITY R
                         WD                    = 10445030010
45STM= 45RWD+1      **SENSE TAPE MARK          = 10445030011
45GFR= 45RWD+2      **GO FWD RD                = 10445030012
45SRM= 45RWD+3      **STOP RD MODE             = 10445030013
45GF= 45RWD+4       **GO FWD                   = 10445030014
45GFW= 45RWD+5      **GO FWD WR                = 10445030015
45REV= 45RWD+6      **RD REV                   = 10445030016
45WCS= 45RWD+7      **WR CHK STOP              = 10445030017
45LPSW=SKM 1.1 45SWITCHES                      =  1721016455
45RWSW=SKM 1.2 45SWITCHES                      =  1722016455
45START= 11000                                 =       11000
45LIST= 45B*                                   =      416530
45REVSW=SKM 1.3 45SWITCHES                     =  1723016455
45NUM= 377726                                  =      377726
45ZSW=SKM 1.4 45SWITCHES                       =  1724016455
45WA2= 45LAST INSTR                            =       16776
45NSW=SKM 1.5 45SWITCHES                       =  1725016455
45LW= 66                                       =          66
45GARBSW=SKM 2.1 45SWITCHES                    =  1741016455
*45DELAYEX=                                    =       20327
*45DELAYK=                                     =       20330
*46LW= 4                                       =           4

ATATAP= 2    **ATTACHER THING                  =           2
*ALLERRS8=                                     =       20335

BR= SIZE/2,,-SIZE                              =  4000767777
BL=-SIZE/2,,-SIZE                              =773777767777
BADOV= 200100                                  =      200100
BWHOS= 4     **TO WHICH PICTURE BLOCK BELONGS
                                               =           4

BLOCK MARK= 6                                  =           6
*BMENTRY8=                                     =       20407
*BMCHK=                                        =       20367
*BMERR=                                        =       20375

CMa= 32                                        =          32
CSQ=RFD *+1                                    =301200203567
CMB= 33                                        =          33
CMANG= 200026                                  =      200026
CMAG= 200021                                   =      200021
COMP= 16      **CONSTRAINT COMPUTATION ROUTINE
                                               =          16
CHVAR= 20     **= CHANGABLE VARIABLES          =          20
CIRCLES= 2*MASBL+PICTURES                      =       24225
CSP= 10       ** CIRCLE START POINT            =          10
CEP= 12       ** CIRCLE END POINT              =          12
```

LMH GX7A 006

83

```
CIRCEN= 14  ** CIRCLE CENTER                    =        14
CVAL= 16    ** CIRCLE ANGLE AND RADIUS          =        16
CVTS= 6     ** VARIABLE TO MOVE TO SATISFY THIS
                                                =         6
CURPICS= 15*SMASBL+LIST+1                       =     24117
CONSTRAINTS= 4*SMASBL+LIST+1                    =     24031
CONLET= 12  **CONSTRAINT LETTER CODE            =        12
*CMP1=                                          =     20352

DISPLAY= 5  **MASTER DISPLAY SUBROUTINE         =         5
DEADS= 11*SMASBL+LIST+1                         =     24067
DESIGS= 13*SMASBL+LIST+1                        =     24103

*ERRS= TX2ERR                                   =     17110
*EOTCHK=                                        =     20343
*EIALOOPB=                                      =     20336
*EIAFNDB=                                       =     20344
*EIALDB=                                        =     20350
*ERRTABLEKB=                                    =     20320
*ERRTABLEB=                                     =     20321
*ELOOPMSG1B=                                    =     20366
*ELOOPMSG2B=                                    =     20370
*ERR= ERRS                                      =     17110

FREES= 5*SMASBL+LIST+1                          =     24037
FREEDOMS= 6*SMASBL+LIST+1                       =     24045
FIXEDS= 12*SMASBL+LIST+1                        =     24075
*FIOAMSGB=                                      =     20353

GETIT= 7    **MASTER FORMATION SUBROUTINE
                                                =         7
GETBLOCKER= 200053                              =    200053
*GORREXIT= 0                                    =         0
*GOODBM=                                        =     20400

HOWBIG= 6   **MASTER SCSZ COMPUTATION           =         6
HOVS= 15*MASBL+PICTURES                         =     24561
HOVP1= 10   ** FIRST HORIZ OR VERT POINT
                                                =        10
HOVP2= 12   ** SECOND HOIIZ OR VERT POINT
                                                =        12
HOVCODE= 14 ** HORIZ=1, VERTICAL=2, EITHER=0
                                                =        14
HOLDERS= 2*SMASBL+LIST+1                        =     24015

INSTANCES= 6*MASBL+PICTURES                     =     24345
IPCONS= 11*MASBL+PICTURES                       =     24441
IBVERTS= 14*MASBL+PICTURES                      =     24535
IPCOTP= 16  ** INSTANCE-POINT CONSTRAINTS WITH THIS
                    VIRGIN                      =        16
```

```
IWHAT= 14    ** WHAT PIC THIS IS INSTANCE OF
                                            =        14
ISIZE= 16    ** R                           =        16
IVAL= 20     ** R COS a, R SIN a, X, Y      =        20
IBVW= 10     ** WHICH INSTANCE IS VERTICAL
                                            =        10
IBVCODE= 12  ** INSTANCE TO BE VERTICAL, HORIZ, ETC
                                            =        12
IPCP= 10     **POINT IN INSTANCE-POINT CONSTRAINT
                                            =        10
IPCI= 12     ** INSTANCE IN INSTANCE-POINT CONSTRAIN
                     T                      =        12
IPCV= 14     ** VIRGIN POINT IN INSTANCE-POINT CONST
                     RAINT                  =        14
*IOASCH8=                                   =     20320
*IOASCHSW8=                                 =     20327
*IOANOTSCH8=                                =     20323
*IOACONT8=                                  =     20334

KA= 15                                      =        15
KIND= 13     ** 1=NOT IN PIC, 2=PPART, 3=PICBLKS
                                            =        13


LIST= 24000 **LIST STRUCTURE START          =     24000
LMSTART= 200022                             =    200022
LMEND= 200024                               =    200024
LMAG= 200020                                =    200020
LINES= 1*MASBL+PICTURES                     =     24201
LSP= 10      **START OF LINE                =        10
LEP= 12      **END OF LINE                  =        12
*LGORR1=                                    =     20326
*LGORR0=                                    =     20322
*LGORREND=                                  =     20334
*LGORR2=                                    =     20333
*LIOAMSG8=                                  =     20363
*LSW8=                                      =     20334
*LENTRY8=                                   =     20322
*LXSET8=                                    =     20415

MASBL= 24    **MASTER BLOCK LENGTH          =        24
MOVIT= 10    **HOW TO MOVE COORDINATES      =        10
MASTERS= LIST+1                             =     24001
MERGERS= 10*SMASBL+LIST+1                   =     24061
MOVINGS= 14*SMASBL+LIST+1                   =     24111
META= 12                                    =        12
*MTLOOP8=                                   =     20323

NCON= 17     **# CONSTRAINTS SHOWN          =        17
NLIST= 23000      **MODEL EMPTY LIST STRUCTURE
                                            =     23000
```

```
NUMBERS= 10*MASBL+PICTURES                              =      24415
NTOSHO= 14  ** SCALER TO BE SHOWN                       =         14
NVAL= 16    ** R COS α, R SIN α, X, Y                   =         16
NEWCONS= 16*SMASBL+LIST+1                               =      24125
NAME= 4                                                 =          4
*NEWH1=                                                 =      20325
*NEWH2=                                                 =      20332
*NTFENTRYB=                                             =      20331
*NORMENTRYB=                                            =      20326
*NORMEXITB=                                             =      20403
*NTFNDMSGB=                                             =      20340
*NENTRYB=                                               =      20320

ORIGIN= 14400                                           =      14400
ONLINES= 12*MASBL+PICTURES                              =      24465
ONCIRCLES= 13*MASBL+PICTURES                            =      24511

PICTURES= 22*SMASBL+LIST+1                              =      24155
POINTS= 4*MASBL+PICTURES                                =      24275
PICBLKS= 2  **NON PICTURE STUFF IN PICTURE
                                                        =          2
PPART= 4    **PICTURE PARTS                             =          4
PPARTM= 10  **MOVING PICTURE PARTS                      =         10
PATAP= 12   **ATTACHERS OF THIS PICTURE                 =         12
PINS= 14    **INSTANCES OF THIS PICTURE                 =         14
PSIZE= 16   **SIZE OF THIS PICTURE                      =         16
PNAME= 17   **NAME OF PICTURE. 36 BITS                  =         17
PSAVE= 20   **6 REGISTERS TO SAVE IN PICTURE
                                                        =         20
PLS= 14     ** LINES ND CIRCLES ON THIS POINT
                                                        =         14
PVAL= 20    ** COORDINATES OF POINT                     =         20
PBOCC= 10   ** CENTER OF POINT ON CIRCLE
                                                        =         10
PBOCS= 12   ** START OF POINT ON CIRCLE                 =         12
PBOCP= 14   ** POINT TO BE ON CIRCLE                    =         14
PBOLE= 10   ** END POINT OF LINE                        =         10
PBOLS= 12   ** START OF POINT ON LINE                   =         12
PBOLP= 14   ** POINT TO BE ON LINE                      =         14
PWHOS= 6    **PICTURE IN PICTURES                       =          6

*RL= 30000                                              =      30000
*RM= RL+100                                             =      30100
*REV= 4                                                 =          4

SIZE= 10000 **LETTER SIZE                               =      10000
SMASBL= 6   **SMALL MASTER BLOCK LENGTH FOR DESIGNA
                          TERS                          =          6
S= 7                                                    =          7
SCCEN= 200035                                           =     200035
```

```
SCSZ= 200034                                          =        200034
SPECB= 2      **SPECIFIC BLOCKS                       =             2
SCALERS= 3*MASBL+PICTURES                             =         24251
SSHOW= 14     ** NUMBERS SHOWING THIS SCALER
                                                      =            14
SVAL= 16      ** VALUE OF SCALER                      =            16
*SPD1= 10                                             =            10
*SPD2= 20                                             =            20
*SPD3= 30                                             =            30
*SPD4= 40                                             =            40
*SCHENTRY=                                            =         20320
*SCENTRY8=                                            =         20333
*SCEBME8=                                             =         20334
*SCRAST=                                              =         20327
*SCRENTRY=                                            =         20326
*SCRM=                                                =         20340
*SCRL=                                                =         20342
*SCRET=                                               =         20344
*SCDATA=                                              =         20347
*SCADD=                                               =         20360
TL=-SIZE/2,,SIZE                                      =773727010000
TR= SIZE/2,,SIZE                                      =    4000010000
TA= 16                                                =            16
T= 10                                                 =            10
TXTS= 20      ** POINTER TO TEXT SHOWN                =            20
TUPLE= 14     **# VARIABLES                           =            14
TEXTS= 7*MASBL+PICTURES                               =         24371
TYPE= 0       **TIES TO SPECB IN MASTER BLOCK
                                                      =             0
TVAL= 14      ** R COS α, R SIN α, X, Y               =            14
TOPOS= 3*SMASBL+LIST+1                                =         24023
TPVAL= 14     **X,Y LOCATION                          =            14
TPVALS= 5*MASBL+PICTURES **TYPICAL VARIABLES
                                                      =         24321
TX2NAME= 372023                                       =        372023
TX2IK=( TX2NAME,,BLOCK MARK,7)                        =         17277
TX2TOG= 377727                                        =        377727
*TAPEK4= 20000                                        =         20000
*TAPEK3= 3000                                         =          3000
*TAPEK2= 1500                                         =          1500
*TAPEK1= 300                                          =           300
*TAFREVDIR=                                           =         20522
*TAFOKF=                                              =         20550
*TAFSCHK=                                             =         20324
*TAFST=                                               =         20557
*TAFSPOK=                                             =         20546
*TAFIOS=                                              =         20473
*TAFBL=                                               =         20545
*TAFWAI=                                              =         20544
```

87

```
                                                   =         20536
*TAFNOTREADY=
                                                   =         20320
*TAFIOASTARTB=
                                                   =         20325
*TAFIOAIOSB=
                                                   =         20341
*TYPEXITB=
                                                   =         20340
*TYPECNTRB=
                                                   =         20333
*TYPELOOPB=
                                                   =         20404
*TAF0R=
                                                   =         20433
*TAF0F=
                                                   =         20377
*TAFGOFWD=
                                                   =         20401
*TAF3R=
                                                   =         20405
*TAF4F=
                                                   =         20413
*TAF4R=
                                                   =         20547
*TAFSTK=
                                                   =         20430
*TAF0FΔ=
                                                   =         20435
*TAFCON=
                                                   =         20502
*TAFREV=
                                                   =         20470
*TAFFOR=
                                                   =         20442
*TAFIOSRET=
                                                   =         20450
*TAF1F=
                                                   =         20451
*TAF2F=
                                                   =         20453
*TAF3F=
                                                   =         20542
*TAFNEGMK=
                                                   =         20526
*TAFLVREV=
                                                   =         20505
*TAFREVSW=
                                                   =         20511
*TAFCOMP=
                                                   =         20514
*TAFERRSW=
                                                   =         20515
*TAFERR=
                                                   =         20520
*TAFERREXIT=
                                                   =         20551
*TAFOKR=
                                                   =         20603
*TAF2R=
                                                   =         20571
*TAF1R=

 VARLOC= 15  **LOCATION OF VARIABLES IN BLOCK
                                                   =            15

 VORD= 6     **ORDERING OF VARIABLES               =             6
 VFLW= 10    ** CONSTRAINTS WHICH THIS VARIABLE IS T
                            O SATISFY              =            10
 VCON= 12    ** CONSTRAINTS ON THIS VARIABLE
                                                   =            12
 VARIABLES= 1*SMASBL+LIST+1                        =         24007

 WORKS= 7*SMASBL+LIST+1                            =         24053
 WHERE= 12   **LOCATION OF THING IN PICTURE
                                                   =            12
*WRSPB=                                            =         20346
*WRENTRY=                                          =         20320
*WRLD=                                             =         20354
*WRESW=                                            =         20345
*WRELOOP=                                          =         20333
*WRLBM=                                            =         20342
```

```
*WRSC=              =   20410
*WRMAINLOOP=        =   20347
*WRCONT=            =   20420
*WRSPL=             =   20414

*XXX= 0             =   0
*XCHKSW=            =   20465
*XXXB= 0            =   0
*XSETKB=            =   20411
*XSETB=             =   20412
*XCHK=              =   20532

Y= 3                =   3

?=#                 =   203566

a= 1                =   1

c= 5                =   5

B= 2                =   2
```

```
--DEF LDAE≡A,B,C,D
LDA A
LDB A+B
LDC A+C
LDD A+D
--EMD

--DEF STAE≡A,B,C,D
STA A
STB A+B
STC A+C
STD A+D
--EMD

--DEF MOVEIA→B
*LDE A
STE B
--EMD

--DEF SUMM≡P→Q=R→S
LDA P
ADD Q
*JOV S
STA R
--EMD

--DEF DIFF≡P→Q=R→S
LDA P
SUB Q
*JOV S
STA R
--EMD

--DEF FABVAL≡P→Q
LDA P
JPA *+2
COM A
STA Q
--EMD

--DEF PROD≡A×B/C=D→E
LDA A
MUL B
DIV C
*JOV E
STA D
--EMD

--DEF STAB≡A
      STA A
```

```
        STB A+1
 --EMD

 --DEF  SQ45DELAY
        1STE  45DELAYEX
        1DPX54 45DELAYK
        RFD54#+1
        1IOS54 30000
        *1TSD  45DELAYK
        21IOS54 30300
        1IOS54 30000
 45DELAYEX→    RFD45#
 45DELAYK→     0
 --EMD

 --DEF  45DELAY≡USECS
        SKX54USECS
        *JPQ  (SQ45DELAY)
 --EMD

 --DEF  LTAKE≡N*XR
        12RSXS1XRLIST+(N)+1
        11RSXT1XRLIST+(N)+1
        1DPXT1SLIST
        2EXXS1TLIST
        1DPXS1XRLIST+(N)+1
        2DPXS1XRLIST+(N)+1
        1DPX01XRLIST+(N)
 --EMD

 --DEF  PUTL≡N*XR→M*XR2
        12AUXXR((N)+1,.-((N)+1))
        12RSXS1XR2LIST+(M)+1
        2DPXS1XRLIST
        11RSXT1SLIST
        1DPXT1XRLIST
        2DPXXR1TLIST
        1DPXXR1SLIST
        11RSXS1XR2LIST+(M)
        *JPXS#+2
        SKXS1XR20
        1DPXS1XRLIST-1
        11AUXXR((N)+1,.-((N)+1))
 --EMD

 --DEF  PUTLQ≡N*XR→M*XR2
        12RSXS1XRLIST+(N)+1
        2EXXS1XR2LIST+(M)+1
        2DPXS1XRLIST+(N)+1
        11RSXT1SLIST
```

```
        1EXXTIXRLIST+(N)+1
        1DPXTISLIST
        11RSXSIXR2LIST+(M)
        *JPXS#+2
        SKXSIXR20
        1DPXSIXRLIST+(N)
**EMD

**DEF   MOVEL≡N*XR→M*XR2
        12RSXSIXRLIST+(N)+1**TAKE
        11RSXTIXRLIST+(N)+1
        1DPXTISLIST
        2EXXSITLIST
        1DPXSIXRLIST+(N)+1
        2EXXSIXR2LIST+(M)+1**PUT
        2DPXSIXRLIST+(N)+1
        11RSXTISLIST
        1EXXTIXRLIST+(N)+1
        1DPXTISLIST
**EMD

**DEF   PUTRE≡N*XR→M*XR2
        12AUXXR((N)+1,.-((N)+1))
        11RSXSIXR2LIST+(M)+1
        1DPXSIXRLIST
        12RSXTISLIST
        2DPXTIXRLIST
        2DPXXRISLIST
        1DPXXRITLIST
        11RSXSIXR2LIST+(M)
        *JPXS#+2
        SKXSIXR20
        1DPXSIXRLIST-1
        11AUXXR((N)+1,.-((N)+1))
**EMD

**DEF   PUTRQ≡N*XR→M*XR2
        11RSXSIXRLIST+(N)+1
        1EXXSIXR2LIST+(M)+1
        1DPXSIXRLIST+(N)+1
        12RSXTISLIST
        2EXXTIXRLIST+(N)+1
        2DPXTISLIST
        11RSXSIXR2LIST+(M)
        *JPXS#+2
        SKXSIXR20
        1DPXSIXRLIST+(N)
**EMD

**DEF   MOVER≡N*XR→M*XR2
```

```
        12RSXSIXRLIST+(N)+1**TAKE
        11RSXTIXRLIST+(N)+1
        1DPXTISLIST
        2EXXSITLIST
        2DPXSIXRLIST+(N)+1
        1EXXSIXR2LIST+(M)+1**PUT
        1DPXSIXRLIST+(N)+1
        12RSXTISLIST
        2EXXTIXRLIST+(N)+1
        2DPXTISLIST
  --EMD

  --DEF COMBL=N*XR-M*XR2
        12RSXSIXRLIST+(N)+1
        2EXXSIXR2LIST+(M)+1
        11RSXTIXRLIST+(N)+1
        2DPXSITLIST
        1EXXTISLIST
        12RSXSIXRLIST+(N)+1
        1EXXTISLIST
        2DPXTIXRLIST+(N)+1
        1DPXTIXRLIST+(N)+1
  --EMD

  --DEF COMBR=N*XR-M*XR2
        11RSXSIXRLIST+(N)+1
        1EXXSIXR2LIST+(M)+1
        12RSXTIXRLIST+(N)+1
        1DPXSITLIST
        2EXXTISLIST
        11RSXSIXRLIST+(N)+1
        2EXXTISLIST
        2DPXTIXRLIST+(N)+1
        1DPXTIXRLIST+(N)+1
  --EMD

  --DEF LGORR=N*XR=XR2-SUBR-LEXIT
  GORREXIT=LEXIT
        1DPXXRLGORR1
        11RSXXR2IXRLIST+(N)+1
LGORR0-         16RSXXRIXR2LIST-1
        *-1JNXXR#+2
        1SKXXR1
        INXXRIXR20
LGORR1-         SXDXR# **MODIFIED
        *JPQ GORREXIT+(GORREXIT/GORREXIT@1*(LGORREND+
                          1))
        11RSXXR2IXR2LIST
        1DPXXR2LGORR2
        *JPQ SUBR
```

```
LGORR2→      SKXXR2#          **MODIFIED
LGORREND→    JPQ LGORR0
--EMD

--DEF LGORL≡N*XR=XR2→SUBR→LEXIT
GORLEXIT=LEXIT
        1DPXXRLGORL1
        12RSXXR2IXRLIST+(N)+1
LGORL0→      16RSXXRIXR2LIST-1
        *-1JNXXR#+2
        1SKXXR1
        INXXRIXR20
LGORL1→      SXDXR# **MODIFIED
        *JPQ GORLEXIT+(GORLEXIT/GORLEXITQ1*(LGORLEND+
                                      1))
        12RSXXR2IXR2LIST
        1DPXXR2LGORL2
        *JPQ SUBR
LGORL2→      SKXXR2#          **MODIFIED
LGORLEND→    JPQ LGORL0
--EMD

--DEF LGORRI≡N*XR=XR2→SUBR→LEXIT
GORRIEXIT=LEXIT
        1DPXXRLGORRI1
        11RSXXR2IXRLIST+(N)+1
LGORRI0→     16RSXXRIXR2LIST-1
        *-1JNXXR#+2
        1SKXXR1
        INXXRIXR20
LGORRI1→     SXDXR# **MODIFIED
        *JPQ GGORRIEXIT+(GORRIEXIT/GORRIEXITQ1*(LGORR
                                    IEND+1))
        1DPXXR2LGORRI2
        11RSXXR2IXR2LIST     **CURRENT NEXT
        *JPQ SUBR
LGORRI2→     SKXXR2#          **MODIFIED
        11RSXXR2IXR2LIST     **NEW NXT
LGORRIEND→   JPQ LGORRI0
--EMD

--DEF LGORLI≡N*XR=XR2→SUBR→LEXIT
GORLIEXIT=LEXIT
        1DPXXRLGORLI1
        12RSXXR2IXRLIST+(N)+1
LGORLI0→     16RSXXRIXR2LIST-1
        *-1JNXXR#+2
        1SKXXR1
        INXXRIXR20
LGORLI1→     SXDXR# **MODIFIED
```

```
        *JPQ GORLIEXIT+(GORLIEXIT/GORLIEXIT01*(LGORLI
                                 END+1))
        1DPXXR2LGORLI2
        12RSXXR2IXR2LIST      **CURRENT NXT
        *JPQ SUBR
LGORLI2→      SKXXR2#          **MODIFIED
        12RSXXR2IXR2LIST      **NEW NXT
LGORLIEND→    JPQ LGORLI0
--EMD

--DEF   NEWH≡N*XR→M*XR2
        11RSXSIXR2LIST+(M)
        *JPXS#+2
        SKXSIXR20
        12AUXXR{(N)+1,.-((N)+1)}
        11RSXTIXRLIST
NEWH1→ SXDTIXR0
        JPQ NEWH2
        1DPXSITLIST-1
        11RSXTITLIST
        JPQ NEWH1
NEWH2→ 11AUXXR{(N)+1,.-((N)+1)}
--EMD

--DEF   COMBHR≡NN*XRR→MM*XRR2
        NEWH≡NN*XRR→MM*XRR2
        COMBR≡NN*XRR→MM*XRR2
--EMD

--DEF   COMBHL≡NN*XRR→MM*XRR2
        NEWH≡NN*XRR→MM*XRR2
        COMBL≡NN*XRR→MM*XRR2
--EMD

--DEF   CHGRR≡NN*XRR→MM*XRR2
        MOVER≡NN*XRR→MM*XRR2
        11RSXSIXRR2LIST+(MM)
        *JPXS#+2
        SKXSIXRR20
        1DPXSIXRRLIST+(NN)
--EMD

--DEF   CHGRL≡NN*XRR→MM*XRR2
        MOVEL≡NN*XRR→MM*XRR2
        11RSXSIXRR2LIST+(MM)
        *JPXS#+2
        SKXSIXRR20
        1DPXSIXRRLIST+(NN)
--EMD
```

```
--DEF TYPEN⊃SC,NUM*WD
      LDC WD
      LDB {3,77,,77}
      3LDB SC
      1SKX NUM-1
      *JES66{TYPEB}
--EMD

--DEF TYPEL⊃SC,NUM*WD
      LDC WD
      LDB {3,77,,77}
      3LDB SC
      1SKX NUM-1
      *JES66{TYPEB}+2
--EMD

--DEF TYPEB
XXXB=0
NENTRYB→      *MKZ4.10LSWB
      *JPQ #+2
LENTRYB→      *MKN4.10LSWB
MTLOOPB→      *1DPX66TYPEXITB
      *DEX66 2
      LDA66 0
      RFD66#+1
      1IOS66 30000
      3TSD B
      25INS TYPECNTRB
      LDB C
TYPELOOPB→    3DPX A
LSWB→ SKZ4.10#
      CAB {3,77,,77}
      CAB #-1*
      3TSD A
TYPECNTRB→    *1JNXXXXBTYPELOOPB
TYPEXITB→     JPQ XXXB
--EMD

--DEF TPKB
      0       **PREDICTED BM,,ACTUAL BM
      0       **X35,,X34
      BPQ36 0 **MODIFIED EXIT
      0       **END WR ADDR,,START WR ADDR
      0       **WA
      0       **ERR BLK,,
      0       **PGM ADDR,,
      0       **IOS REPORT
      0       **SEL,ERR TYPE,,X37
      10      **K,FOR FWD OR REV
      0       **LAST SC SUMCHK,,LAST WR SUMCHK
```

```
--EMD

--DEF SUMCHKCMP
      1STE (TPKB)+2        **SAVE RETURN
      *LDE (TPKB)+10.      **CUMULATIVE SUM CHK
      2SED E
      JPQ CMP1     **CORRECT
      TYPEL,6 36*(603536,,704641)
      SKX36 0
      RFD46(TPKB)+2*
  CMP1- SKX36 1
      JPQ (TPKB)+2*
--EMD

--DEF IOAB
  IOASCHB-    *2STE (TPKB)+6        **PGM ADDR
      MKN4.10IOASCHSWB
      JPQ #+3
  IOANOTSCHB-  *2STE (TPKB)+6       **PGM ADDR
      MKZ4.10IOASCHSWB
      *1IOS46 20000
      STE (TPKB)+7 **SAVE REPORT
  IOASCHSWB-    SKN4.10#      **SKIP FOR SCH
      JPQ IOACONTB
      LDA (TPKB)    **PRED.,ACTUAL BM
      SKN1.5(TPKB)+7      **SKIP FOR REV
      22LDA A      **BM READ
  IOACONTB-    1SKX34 (LIOAMSGB-FIOAMSGB)
      SKX36 3 **FOR ERRLOOP
  EIALOOPB-    25LDC34LIOAMSGB
      25STC #+1
      SKZXX(TPKB)+7       **CHK REPORT BITS
      JPQ EIAFNDB
      SKX36 4 **FOR ERRLOOP
      *1JNX34EIALOOPB
  EIAFNDB-    SKN4.1EIALOOPB*     **SKIP IF WR TYPE
      JPQ EIALDB
      SKN1.9(TPKB)+7      **SKIP IF WRITING
      *1JNX34EIALOOPB     **IGNORE CONDITION
  EIALDB-     22LDC34LIOAMSGB     **TYPE OF ERROR
      RFD46(ERRLOOPB)*
      JPD #  **NOT USED
  FIOAMSGB-    0,744,,343042       **MIS 2.4
      0,706,,334336       **LTO 4.6
      1,771,,433625       **TOF 3.9
      1,705,,322450       **KEY 4.5
      1,770,,343723       **MPD 3.8
      0,710,,252443       **FET 4.8
      0,711,,412443       **RET 4.9
      0,707,,353436       **NMO 4.7
```

```
LIOAMSGB→    0,745,,243020        **EIA 2.5
      ,,753374      **?
→→EMD

→→DEF ERRLOOPB
      **FOR INDIVIDUAL
ERRTABLEKB→  ERRTABLEB36*
ERRTABLEB→   NTFENTRYB      **NOT FOUND ENTRY
      SCENTRYB       **SUM CHECK ENTRY
      BMENTRYB       **BLOCK MARK ENTRY
      ALLERRSB       **MISAL ENTRY
      ALLERRSB       **EIA ENTRY
NORMENTRYB→  5DPX (TPKB)+8.        **CLR ERR TYPE
      SKX36 1
      JPQ NORMEXITB
NTFENTRYB→   SKX36 5
      JPQ ALLERRSB
SCENTRYB→    22SUB (TPKB)+9.     **10 OR 0
SCEBMEB→     21LDC (422224,,213424)      **SCE
ALLERRSB→    5DPX36 (TPKB)+8.     **SAVE ERR TYPE
      21STA (TPKB)+5       **BLK NO
      1IOS41 20000  **DISC IOA SEQ
NTFNDMSGB→   1LDC (354325,,703443)       **MT
      TYPEL?(60),634
      1SKX35 (LXSETB-XSETKB)       **WD CNTR
WRSPB→ *3TSD (70)    **SPACE
      *3TSD (70)    **SPACE
      *3TSD (70)    **SPACE
      *1JNX35 ELOOPMSG1B
TYPEL?(70),335*21TX21K
      TYPEN?(70),535*21(TPKB)+5
      3TSD (60)
      RFC46 NORMEXITB-1
ELOOPMSG1B→  13RSX37 XSETKB*       **NO OF QUARTERS-1
      LDB35 (TPKB)+8.        **WORD
ELOOPMSG2B→  STB (TPKB)+4 **WA
      TYPEN?(70),334*B
      LDB (TPKB)+4 **WA
      CYB XSETB     **SET NEXT QUARTER
      *1JNX37 ELOOPMSG2B   **TYPE NXT QUARTER
      JPQ WRSPB
      SKX36 0 **SET X36
NORMEXITB→   1RSX34 (TPKB)+1       **RESET X34
      2RSX35 (TPKB)+1        **RESET X35
      1RSX37 (TPKB)+8.       **RESET X37
      JPQ (TPKB)+2*          **RETURN TO PGM
BMENTRYB→    22LDC SCEBMEB*       **BME
      JPQ ALLERRSB **WRITE MSG
XSETKB→      LXSETB35
XSETB→ 9.,-1
```

```
        -1
        -3
LXSETB→       0
→→EMD

→→DEF TURNOFFΔ
        *2STE (TPKB)+6         **PGM ADDR
        *1IOS46 20000 **DISCONNECT
        *STE (TPKB)+7          **SAVE REPORT
        *1IOS41 40000 **LOWER FLAG
        *12LDE (TPKB)+6        **RETURN ADDR
        *JPQ E*         **RETURN TO PGM.
→→EMD

→→DEF TAFIOAΔ
TAFIOASTARTB→     *2STE (TPKB)+6
        *1IOS46 0
        *3STE TAFIOAIOSB
        SKZ2.5E       **MISAL?
        JPQ (IOAB)+1
TAFIOAIOSB→  1IOS46 34000  **CLR ERROR
        JPQ TAFIOASTARTB
→→EMD

→→DEF SEARCHΔ
RL=30000
RM=RL+100
SPD1=10
SPD2=20
SPD3=30
SPD4=40
REV=4
TAPEK4=20000
TAPEK3=3000
TAPEK2=1500
TAPEK1=300
XXX=0
        **SPECIAL SEARCH TO AVOID ERRORS
        **FOR INDIVIDUAL
        **(TPKB)=PREDICTED BM..ACTUAL BM
        **(TPKB)+1=ORIG X35..ORIG X34
        **TAFBL=-(ORIG X34)..
SCHENTRY→     *1STE (TPKB)+2         **SAVE RETURN
        *JNX46 TAFREVDIR       **LEAVE REV?
        *MKZ1.1XCHKSW          **SET FOR FWD
        *LDE TAFDKF  **FWD CONSTANTS
TAFSCHK→      *1STE TAFST
        *21STE TAFST-1
        *LDE TAFSPDK
        *SXD46 2         **CHK FOR SPD2 EXIT
```

```
    *2LDE E
    1STE TAFIOS
    RFD46*+1
    1SKX36 4        **ERR CNTR
    SKX41(JPD *)
    1IOS41 30000    **CONNECT IOA
    1DPX34(TPK8)+1        **SAVE SEARCH NO.
    2DPX34TAFBL     **ORIGINAL NO.
    21COM, TAFBL    **-(ORIG NO.)
    2DPX35(TPK8)+1        **SAVE X35
    1DPX37(TPK8)+8.       **SAVE X37
EOTCHK-       *1IOS46 0       **GET REPORT
    *SKN4.3E        **SELECTION COMPLETE?
    JPQ EOTCHK      **WAIT
    SKU3.7E         **OPERABLE SPEED?
    JPQ EOTCHK      **WAIT
    *1IOS46 36200 **CLR ALARMS.CHG RS.MOVE TAPE
    STE TAFWA1      **SAVE REPORT
    *1IOS46 34200 **CLR ALARMS.CHG RS.MOVE TAPE
    *IOS46 20000    **DISC
    6STE (TPK8)+8.        **SAVE SELECT
    SKZ4.6TAFWA1 **UNIT READY?
    *JPQ TAFNOTREADY
    SKX41(TAFIOA4)
    SKZ4.8TAFWA1 **NO FWD EOT?
    JPQ TAFOR       **GO REV
    SKZ4.9TAFWA1 **NO REV EOT?
    JPQ TAFOF       **GO FWD
    DEX34 0         **FWD ROLL
    SKZ1.3(TPK8)+7        **WAS TAPE GOING IN REV?
    INX34 100
    *JNX34TAFGOFWD
    *12LDE (TPK8)         **CURRENT POSITION
    *SKZ4.9E
    *DPX E
    SXL34E*
    JPQ TAFGOFWD
    1SKX34 1        **GO REV
    JPQ TAFIOS      **SET IOS INSTRUCTIONS
TAFGOFWD-     SKX34 0
    JPQ TAFIOS
    **FAST LOOPS
    **GO MORE IN REVERSE DIRECTION
TAF3R-SXD34 3
    *-1JPX34TAFIOS        **GO TO SLOW LOOP SPD 2 FW
                          D
    *-1JPX34TAF4F+1       **SLOW TO SPD 3 FWD
TAFOR- 1SKX34 5     **REV SPD4
TAF4F- 3DPX (TPK8)  **CLR FINE MK
    *LDE TAFIOS*
```

```
       1STE *+1
       *1IOS46XXX    **RD MKS
       STE (TPK8)+7
       *11LDE (TPK8)        **CURRENT BLK
TAF4R→ 2STE (TPK8)  **EXPECTED BLK
       *4TSD (TPK8) **COARSE MK
       *SKZ2.9E     **NEG MK?
       *JMP TAF4R+1 **IGNORE
       *2SED'E      **EXPECTED MK
       *JMP *+2     **GOOD MK
       *JMP TAF4R
       11RSX35E     **BLK READ
       2AUX35TAFBL  **-(ORIG NO.)
       1AUX35TAFSTK*        **SPD SPREAD
       *JPX35TAF3R  **GO MORE IN REV.
       2AUX35TAFSTK*
       *JPX35TAF4R-1        **CONTINUE AT SAME SPEED
       **GO MORE IN FORWARD DIRECTION
TAF0FB→      1SXD344
       *1JNX34TAF1OS        **GO TO SLOW LOOP SPD 2 RE
                              V
       *1JNX34TAF4F+1       **SLOW TO SPD 3 REV
TAF0F→ SKX344 **FWD SPD 4
       JPQ TAF4F
       **SLOW LOOPS
TAFCON→      2AUX35TAFBL  **-(ORIG BLK)
       1AUX35TAFSTK*        **LIMIT AT THIS SPD
       *JPX35TAFREV
       2AUX35TAFSTK*
       *JNX35TAFFOR
TAF1OSRET→   *12RSX37(TPK8)       **PREDICTED BM
       11RSX35E     **BM READ
       DEX3510      **PRECEDING BLK
       SXL340 **REV?
       INX3520      **NXT BLK
       2DPX35(TPK8) **NXT PREDICTED BLK
TAF1F→ *4TSD (TPK8) **BLK MK
TAF2F→ *1IOS46XXX   **RD LINES
       *3TSD (TPK8) **FINE MK
TAF3F→ 1IOS46XXX    **RD MKS
       *11RSX35(TPK8)       **BM READ
       *JNX35TAFNEGMK
       2SED E **BM PREDICTED
       JPQ TAFCON   **CONTINUE
       DEX3710      **FOR REV
       SXL340 **REV?
       INX3720      **FOR FWD
       SXD371350    **I>LAST PREDICTION?
       JPQ TAFCON   **CONTINUE
XCHKSW→      1SXD340      **MOD TO 1SXD341 FOR REV
```

```
        JPQ XCHK
        JPQ TAFIOSRET          **IGNORE WHAT WAS READ
TAFFOR→      *1JNX34TAFLVREV
        SXL34 4
        JPQ TAF4F    **FWD SPD4
TAFIOS→      *LDE34XXX    **IOS K
        *22STE TAF2F **RD LINES
        *1STE TAF3F  **RD MKS
        1STE *1+1     **RD MKS
        *1IOS46XXX   **RD MKS
        STE (TPKB)+7 **SAVE REPORT
        JPQ TAFIOSRET
TAFREV→      *-1JPX34TAFIOS
        SXG34 5
        JPQ TAF4F    **SPD4 LOOP
TAFREVSW→    SKZ1.1XCHKSW **LV FWD?
        JPQ TAFIOS
        SXG34 2
        JPQ TAFIOS
TAFCOMP→     *1LDE (TPKB) **BLK READ
        1SED (TPKB)+1        **BLK NEEDED
        JPQ (ERRLOOPB)+6     **LEAVE SEARCH. BLK FOUND
TAFERRSW→    *1JNX36TAFIOS          **ERR CNTR
TAFERR→      *JPQ (TURNOFFΔ)        **PGM ADDR
        21LDC (354325,,703443)      **NTF
        SKX36 0
TAFERREXIT→  22LDA (TPKB)+1         **ORIGINAL NO
        JPQ (ERRLOOPB)*        **NTF OR EIA ENTRY
TAFREVDIR→   *1SKX46146 0   **COMPL. X46
        *MKN1.1XCHKSW        **SET TO LEAVE REV
        LDE TAFDKR    **REV K
        *JMP TAFSCHK
TAFLVREV→    *JNX34TAFIOS **CHK FOR CHG OF DIR
        SKN1.1XCHKSW **LV REV?
        JPQ TAFIOS
        JPQ TAFCOMP
XCHK→ *11LDE (TPKB)          **BM READ
        1SED (TPKB)+1        **BM NEEDED
        JPQ (ERRLOOPB)+6     **LEAVE SEARCH. BLK FOUND
        JPQ TAFIOSRET        **IGNORE
TAFNOTREADY→ 2STE (TPKB)+6         **PGM ADDR
        22LDC (,,334336)    **LTO
        SKX36 4
        JPQ TAFERREXIT       **EIA ENTRY
TAFNEGMK→    22STE (TPKB) **TAKE PREDICTION
        JPQ TAFIOSRET
TAFWAI→      0
TAFBL→ 0
TAFSPDK→     TAF2R,,TAF1R
TAFSTK→      TAFST34
```

```
TAFDKF→      TAPEK1+10,,10
TAFDKR→      TAPEK1-10,,-10
      **SPEED TABLES
      377777-TAPEK4,,-377777
      TAPEK4-TAPEK3,,-TAPEK4
      TAPEK3-TAPEK2,,-TAPEK3
      TAPEK2-TAPEK1,,-TAPEK2
      TAPEK1+10,,-TAPEK1  **MOD TO TAPEK1-10,,-TAPEK
                            1
TAFST→ TAPEK1-10,,10      **MOD TO TAPEK1-10,,-10
      TAPEK2-TAPEK1,,TAPEK1
      TAPEK3-TAPEK2,,TAPEK2
      TAPEK4-TAPEK3,,TAPEK3
      377777-TAPEK4,,TAPEK4
      RL+REV+SPD4,,RM+REV+SPD4
      RL+REV+SPD3,,RM+REV+SPD3
      RL+REV+SPD2,,RM+REV+SPD2
      RL+REV+SPD1,,RM+REV+SPD1
      RL+REV,,RM+REV
TAF1R→ RL,,RM
      RL+SPD1,,RM+SPD1
      RL+SPD2,,RM+SPD2
      RL+SPD3,,RM+SPD3
      RL+SPD4,,RM+SPD4
      RL+REV+SPD4,,RM+REV+SPD4
      RL+REV+SPD3,,RM+REV+SPD3
      RL+REV+SPD2,,RM+REV+SPD2
      RL+REV+SPD2,,RM+REV+SPD2
      RL+REV+SPD2,,RM+REV+SPD2
TAF2R→ RL+SPD2,,RM+SPD2
      RL+SPD2,,RM+SPD2
      RL+SPD2,,RM+SPD2
      RL+SPD3,,RM+SPD3
      RL+SPD4,,RM+SPD4
--EMD

--DEF  SCFΔ⊃X→YISELECT,ERROR
ERR=ERROR
      11OS46 60000+SELECT  **SELECT TAPE
      RSX34X **LOW NO.
      RSX35Y **HIGH NO.
      DEX3410        **PREV BLK
      *SKX46 2       **SPD 2
      *JPQ (SEARCHΔ)        **SEARCH RTNE
      *JPQ ERR       **ERR ADDR
      *JPQ (SCF2Δ)  **SUM CHK RTNE
      *JPQ ERR       **ERR ADDRESS
--EMD

--DEF  SCRΔ⊃X→YISELECT,ERROR
```

```
ERR=ERROR
      1IOS46 6/0000+SELECT **SELECT TAPE
      RSX34X **HIGH NO.
      RSX35Y **LOW NO.
      INX3410      **FOR SEARCH
      *1SKX46 2    **FOR SPD2
      *JPQ (SEARCHΔ)        **SEARCH RTNE
      *JPQ ERR     **ERR ADDR
      *JPQ (SCR2Δ) **SUMCHK RTNE
      *JPQ ERR     **ERR ADDRESS
--EMD

--DEF SCF2Δ
XXX=0
      1STE (TPKB)+2         **SAVE RETURN
      MKN1.4(TPKB)+9.       **SET TO 10
      2DPX34A        **PREV BLK NO.
      22ADD (-10.,10)       **10→D3
      22STA (TPKB)+1        **SAVE LOW NUMBER
      2DPX35(TPKB)+1        **SAVE X35
SCRENTRY→    SKX41(IOAB)+3       **SET IOA SEQ
      DEX351 3410    **NO OF BLKS → X35
      SKX36 1 **SET X36
      1DPX37(TPKB)+8.       **SAVE X37
      1LDB (30130) **RMF3
      SKN1.4(TPKB)+9.       **CHK FOR SCF OR SCR
      MKN1.3B      **CHG TO RMR3
      1STB SCRM    **IOS RM
      1STB SCRL    **IOS RL
      MKZ1.7SCRL   **CHG TO RL
SCRM→ 1IOS46XXX    **RM
      *6TSD B      **COARSE MK
SCRL→ *1IOS46XXX   **RL
      *JPQ BMCHK   **CHK FOR BLK MK
SCRET→ *3TSD A     **SUMCHK L.O.
      SKX34177     **DATA CNTR
      *4TSD D      **DATA
SCDATA→      *3TSD D       **DATA
      1ADD D **TO SUMCHK
      *4TSD D      **DATA
      *3TSD D      **DATA
      1ADD D **TO SUMCHK
      *4TSD D      **DATA OR SUMCHK
      *-1JPX34SCDATA       **MORE DATA?
      *3TSD D      **SUMCHK
      20ADD D      **BM., SUMCHK
SCADD→ *4TSD B     **DUMMY
      *1JNA (TURNOFFΔ)      **SUMCHK ERR
      *1JNA (ERRLOOPB)*     **SUMCHK ERR
      *3TSD B      **FINE MK
```

```
        *1JPA (TURNOFFΔ)      **SUMCHK ERR
        *1JPA (ERRLOOPB)*     **SUMCHK ERR
        *6TSD B         **COARSE MK
BMCHK→  21STA (TPKB)  **EXPECTED BM
        *5TSD B         **FINE MK
        22STB (TPKB)  **BM READ
        *4TSD B         **DUMMY
        *21SED A        **CHK AGAINST EXPECTED
        *JPQ GOODBM   **CORRECT BM
BMERR→  *JPQ (TURNOFFΔ)
        SKX36 2
        *JPQ (ERRLOOPB)*      **TO ERR MSG
GOODBM→       *4TSD A         **SUMCHK H.O.
        *-10JPX35SCRET        **DONE?
        *JPQ (TURNOFFΔ)
        1IOS41 20000
        2STD (TPKB)+10.
        JPQ (ERRLOOPB)+6      **RESET INDICES
--EMD

--DEF  SCR2Δ
        1STE (TPKB)+2         **SAVE RETURN
        MKZ1.4(TPKB)+9.       **SET TO 0
        1DPX35(TPKB)+1        **SAVE LOW NUMBER
        SKX35134 0     **HIGH ADDR+10→X35
        11RSX34(TPKB)+1       **LOW ADDR
        2DPX35A        **SET A
        21ADD (-10.,10)       ** -10→D3
SCRAST→         21STA (TPKB)+1        **SAVE HIGH ADDR
        JPQ (SCF2Δ)+6         **TO SUMCHK RTNE
--EMD

--DEF  WR2Δ
XXX=0
        **DO NOT WRITE BLOCK MARKS
WRENTRY→      1STE (TPKB)+2           **RETURN
        2DPX35(TPKB)+1        **X35
        1DPX37(TPKB)+8.       **X37
        2DPX34A        **PREV BLOCK
        22ADD (-10.,10)       **START BLOCK
        22STA (TPKB)+1        **X34
        22STA (TPKB)+3        **LOW END
        DEX35137 0     **-(NO OF WDS)→X35
        1DPX37WRLD     **STARTING CORE ADDR
        MKZ4.10WRESW
        SKX41(IOAB)+3
WRELOOP→        21STA (TPKB)  **PREDICTED BM
        1IOS46 30100   **RMF0
        *4TSD (TPKB)  **COARSE MK
        1IOS46 30000   **RLF0
```

```
        *³TSD (TPK8) **FINE MK
        ²SED A **COMP WITH EXPECTED
        JPQ WRESW
WRLBM→ *JPQ (TURNOFFΔ)
        SKX₃₆²
        *JPQ (ERRLOOP8)*     **ERR LOOP
WRESW→ SZN₄.₁₀#
        JPQ WRSC
WRMAINLOOP→  ¹IOS₄₆30400  **WLFO
        ¹LDA (0..-0) **FOR SUM CHK
        ³TSD A **SUM CHK H.O.
        ³TSD A
        ¹SKX₃₄177
WRLD→  LDB₃₅XXX       **WD FROM CORE
        ⁶TSD B **DATA
        ⁵TSD B **DATA
        ²ADD B **FOR SUM CHK
        ⁴TSD B **DATA
        ³TSD B **DATA
        ¹ADD B **FOR SUM CHK
        *¹JNX₃₄WRCONT          **END OF BLOCK
        ¹COM A
        ¹¹RSX₃₄A
        ¹ADX₃₄45WA   **CONTINUOUS SUMCHK
        ⁴TSD A **SUM CHK H.O.
        ²²ADD (-10..10)        **NXT BM NO
        ³TSD A **SUM CHK L.O.
        ¹IOS₄₆30000  **RLFO
        ²¹STA (TPK8) **BM PREDICTED
        ²²STA (TPK8) **BM TO BE READ
        *³TSD E        **DUMMY
        *³TSD E        **FINE MK
        *⁴TSD E        **COARSE MK
        *¹IOS₄₆0       **REPORT
        SKU₄.₄E        **BM PASSED?
        *JPQ WRSPL     **ERROR
        *³TSD E        **FINE MARK
        *¹JNX₃₅WRMAINLOOP    **NO WORDS LEFT?
        ²¹STA (TPK8)+3        **LAST BM WRITTEN
        ²²ADD (-10..10)
        JPQ WRELOOP
WRSC→  *JPQ (TURNOFFΔ)
        ¹IOS₄₁20000
        ¹STA (TPK8)+10.       **SAVE LAST SUM CHK
        JPQ (ERRLOOP8)+6      **NORMAL EXIT
WRSPL→ *JPQ (TURNOFFΔ)
        SKX₃₆²
        ²²LDC (223437..423733)      **SPL
        *JPQ (ERRLOOP8)+4*
WRCONT→      *¹JNX₃₅WRLD  **ANY DATA LEFT?
```

```
        12LDB (0,,-0)          **0
        JPQ WRLD+1
--EMD

--DEF WRΔ⊃X→Y-BLOCK|SELECT,ERROR
ERRS=ERROR
        1IOS46 60000+SELECT **SELECT TAPE
        RSX34BLOCK   **TP BLK
        RSX35X **CORE LOW ADDR
        RSX37Y **CORE HIGH ADDR
        DEX34 310     **31 BLKS PREV
        *JNX34#+3
        *JPQ (SEARCHΔ)
        *JPQ #+1
        INX34 300     **PREV BLOCK
        *JPQ (SEARCHΔ)        **SEARCH RTNE
        *JPQ ERRS     **ERROR ADDRESS
        *JPQ (WR2Δ)   **WR RTNE
        *JPQ ERRS     **ERR ADDR
        SCRΔ⊃12(TPKB)→11(TPKB)+3,ERRS
        SCFΔ⊃11(TPKB)+3→12(TPKB)+3,ERRS
        *JPQ (SUMCHKCMP)
        *JPQ ERRS
--EMD
```

10+

```
         LMH   GX7A   036
2000141
        *JMP   TEXTMAG        **TEXT    |400500 014526|    014
I15→    *JMP   LETMAG**LETTERS          |400500 014762|    015
        *JMP   NUMMAG**NUMBERS          |400500 014616|    016
2000761
        JPQ   STARTS                    |140500 014400|    076
        *JMP   TEXTCNG                  |400500 014446|    077
2001201
RIBM→   *JMP   45SR                     |400500 015777|200120
RIBMN→  *JMP   45SRN                    |400500 015774|    121
WIBM→   *JMP   45SW                     |400500 016017|    122
WIBMN→  *JMP   45SWN                    |400500 016014|    123
RGARB→  *JMP   45GARB                   |400500 016007|    124
45CURRENT→
        0                               |000000 000000|    125
RDTX2→  *JMP   TX2RD                    |400500 017127|    126
WRTX2→  *JMP   TX2WR                    |400500 016777|    127
ORIGIN1
S
```

```
STARTS→RXF 65 KEYSTART
       ~GPX 45CURRENT
       RXF 66 TYPESTART
       **TYPEWRITER INPUT
KEYSTART→
       CSQ65
       MKZ META 45TYPE
       MOVEI( 17)→TEXTPLACE
       1IOS 65 30000
       RXF 66 TYPESTART
       REX KA 17
       *TSD KA KEYTAB
       1IOS 66 50000
       -1JPX KA#-2
       JPQ #-4
TYPESTART→
       CSQ66
       21IOS 66 30000
       REX TA 17
       SXD TA|KA
       JPD #-1
       *TSD TA KEYTAB
       -1JPX TA#-3
       JPQ #-5
KEYTAB→ 0
       0
       0
       0
       0
       0
       0
       0
       0
       0
       0
       0
       0
       0
       0
       0
       **TEXT CHANGE
TEXTCNG→
       1STE TEXTCNGEX
       RSX α TEXTPLACE
       SXD α|KA
       JPQ TEXTCNGEX
       REX β MOVINGS-LIST
       LGCORR≡SPECD×β=S→TEXTCNG1
TEXTCNGEX→
       JPQ #
```

```
TEXTCNG1→
        ¹STE  TEXTCNGX
        *LDE B LIST+TYPE
        ¹SED ( TEXTS-LIST)
        JPQ #+2
TEXTCNGX→
        JPQ #
        RSX Y1B TXTS+LIST  **# NOW IN TAB
        SXL Y 44
        JPQ  TEXTCNGX
        13RSX S1α KEYTAB
TXCG1→  SXD S 62     **BACKSPACE
        JPQ  TXCGBAC
        SXD S 16     **NO
        JPQ  TXCGNO
TXCG2→  DPX Y A
        CYA (-2,)
        21CYA (-4,)
        ADD (13STB B LIST+TXTS+1)
        DPX S B
        STA #+1
        #**13STBBLIST+TXTS+1+N
        INX Y 1
TXCG3→  DPX Y1B TXTS+LIST
        -1JPX α#+2
        REX α 17
        DPX α TEXTPLACE
        JPQ  TEXTCNG+1
TXCGBAC→
        -1JPX Y TXCG3
TXCGNO→REX Y 0
        JPQ  TXCG3
TEXTMAG→
        ¹STE  TEXTMAGEX
        LDAE≡200022,1,2,3
        STAE≡RCOS,1,2,3
        MOVE1200026→TEXT
        25DPX  TEXT
        LDB  RCOS
        SCB (-1,)
        SUMM≡RCOS→ B≡NRCOS→BADOV
        LDB  RSIN
        SCB (-1,)
        SUMM≡RSIN→ B≡NRSIN→BADOV
        REX CMα 0
        REX CMB 3
TEXTMAG1→
        MOVE1TEXTMAG1TCMB→TEXTMAG1A
        DPX CMB TEXTINDEX
        2DPX CMα TEXTINDEX
```

```
TEXTMAGIA→
     #**13-16LDA *TEXT
     STA  LETTER
     *JPQ  LETMAGINT
     SUMM≡XPOS→NRCOS=XPOS→BADOV
     DIFF≡YPOS→NRSIN=YPOS→BADOV
     RSX  CMB TEXTINDEX
     -1JPX  CMB TEXTMAGIB
     REX  CMB 1
     1ADX  CMB TEXT
     REX  CMB 3
TEXTMAGIB→
     2RSX  CMα TEXTINDEX
TEXTMAGIX→
     16LDA  TEXT
     INX  CMα 1
     SXL  CMα* A
TEXTMAGEX→
     JPQ #
     JPQ  TEXTMAGI
TEXTMAGIT→
     16LDA *TEXT
     15LDA *TEXT
     14LDA *TEXT
     13LDA *TEXT
NUMMAG→1STE  NUMMAGEX
     LDAE≡200022,1,2,3
     STAE≡RCOS,1,2,3
     MOVE1200026→NUMBER
     DIFF≡XPOS→SCCEN→BADOV
     FABVAL→ B
     DIFF≡YPOS→SCCEN+1→BADOV
     FABVAL
     SUB  B
     JNA  #+3
     ADD  B
     STA  B
     LDA  SCSZ
     SUB  B
     JPA  NUMMON
     STA  B
NUMMAGI→
     FABVAL≡RSIN→ C
     FABVAL≡RCOS
     SUMM→ C→BADOV
     SUMM→ A→BADOV
     SUMM→ A→BADOV
     SUMM→ B→BADOV
     JNA  NUMMAGEX
NUMMON→REX  CMα 4
```

```
      SUMM≡RCOS→ A→BADOV
      SUMM→RCOS→BADOV
      STA  B
      SCB  (-1.)
      STB  NRCOS
      SUMM→XPOS=XPOS→BADOV
      SUMM≡RSIN→ A→BADOV
      SUMM→RSIN→BADOV
      COM  A
      STA  B
      SCB  (-1.)
      STB  NRSIN
      SUMM→YPOS=YPOS→BADOV
      LDA  NUMBER
      MUL  ( 100000...)
      JPA  NUMMON1
      COM  A
NUMMON1→
      20SAB (-17..)
      20DIV ( 12..)
      22STB  LETTER
      STA  NUMTT
      DPX  CMa NUMTS
      *JPQ  LETMAGINT
      DIFF≡YPOS→NRSIN=YPOS→BADOV
      DIFF≡XPOS→NRCOS=XPOS→BADOV
      LDA  NUMTT
    21JPA  *+2
      JPQ  NUMMON2
      RSX  CMa NUMTS
      -1JPX CMa NUMMON1
NUMMON2→
      LDA  NUMBER
      JNA  *+2
      JPQ  NUMMAGEX
      MOVE1( 55)→LETTER  **MINUS SIGN
      *JPQ  LETMAGINT
NUMMAGEX→
      JPQ  *
LETMAG→1STE  LETMAGEX
      LDAE≡200022.1.2.3
      STAE≡RCOS.1.2.3
      MOVE1200026→LETTER
      JPQ  *+2
LETMAGINT→
      1STE  LETMAGEX
      DIFF≡XPOS→SCCEN→BADOV
      FABVAL→ B
      DIFF≡YPOS→SCCEN+1→BADOV
      FABVAL
```

```
        SUB   B
        JNA  *+3
        ADD   B
        STA   B
        LDA   SCSZ
        SUB   B
        JPA   LETMON
        STA   B
LETMAG1→
        FABVAL≡RSIN→ C
        FABVAL≡RCOS
        SUMM→ C→BADOV
        SUMM→ B→BADOV
        JNA   LETMAGEX         **OFF SCOPE
LETMON→RSX  CMa LETTER
        SXL  CMa LETDISLAST-LETDIS+1
        JPQ   LETMAGEX
        JNX  CMa LETMAGEX
        11LDA  CMa LETDIS
        STA   LETΔ
        16RSX  CMa*LETΔ
        JPQ   LETMAG2X
LETMAG2→
        DPX  CMa LETCNT
        RSX  CMa LETΔ
        *JPQ   LETMAG3
        STAB≡LMSTART
        INX  CMa 1
        *JPQ   LETMAG3
        STAB≡LMEND
        LDA  CMa 377777
        INX  CMa 2
        DPX  CMa LETΔ
        SKN  3.1  A
        JPQ   LETMAG2L
LETMAG2C→
        11LDA   A
        17STA   CMANG
        *JPQ   CMAG
        JPQ  *+2
LETMAG2L→
        *JPQ   LMAG
        RSX  CMa LETCNT
LETMAG2X→
        -1JPX  CMa LETMAG2
LETMAGEX→
        JPQ  *
LETMAG3→
        1STE  LETMAG3X
        PROD≡12  1CMa*RSIN/( SIZE)=LETS→BADOV
```

```
        PRODE11 1CMa*RCOS/( SIZE)→BADOV
        DIFF→LETS→BADOV
        SUMM→YPOS=LETT→BADOV
        PRODE12 1CMa*RCOS/( SIZE)=LETS→BADOV
        PRODE11 1CMa*RSIN/( SIZE)→BADOV
        SUMM→LETS→BADOV
        SUMM→XPOS→BADOV
        LDB LETT
LETMAG3X→
        JPQ #
LETDIS→ ZERO
         ONE
         TWO
         THREE
         FOUR
         FIVE
         SIX
         SEVEN
         EIGHT
         NINE
LETDIS1→
         SPACE
         SPACE
         SPACE
         SPACE
         SPACE
         SPACE
         AA
         BB
         CC
         DD
         EE
         FF
         GG
         HH
         II
         JJ
         KK
         LL
         MM
         NN
         OO
         PP
         QQ
         RR
         SS
         TT
         UU
         VV
         WW
```

```
        XX
        YY
        ZZ
        LPAREN
        RPAREN
        PLUS
        MINUS
        COMMA
        DOT
LETDISLAST→
        SPACE
RCOS→   0
RSIN→   0
XPOS→   0
YPOS→   0
LETTER→ 0
SPACE→  0
ONE→    3.    **#PARTS. LINE-CIRC..ANGLE
       -SIZE/4..3*SIZE/4  **START POINT
        SIZE **CENTER OR END
        0
        SIZE
        0..-SIZE
        0
       -SIZE/4..-SIZE
        SIZE/4..-SIZE
TWO→    3001..525425
       -SIZE/2..4071*SIZE/10000
        (424.)*SIZE/(1000.)
        1..62446
        1305*SIZE/10000..-336*SIZE/10000
        BR
        0
        BL
        BR
THREE→  3.
       -SIZE/2..SIZE
        2*SIZE/3..SIZE
        0
        2*SIZE/3..SIZE
        SIZE/3
        1..-240000
        SIZE/3
        0..-SIZE/3
FOUR→   3.
        SIZE/6..SIZE
       -2*SIZE/3..-SIZE/3
        0
       -2*SIZE/3..-SIZE/3
        SIZE/2..-SIZE/3
```

```
        0
        SIZE/6,,SIZE
        SIZE/6,,-SIZE
FIVE→   3,
        -(1732.)*SIZE/(3160.),,SIZE
        -(1732.)*SIZE/(3160.),,
        1,,-5*400000/6
        -(1732.)*SIZE/(3160.),,
        -SIZE/3
        0
        -(1732.)*SIZE/(3160.),,SIZE
        SIZE/2,,SIZE
SIX→    3,1,,140,0
        (1574.)*SIZE/(4000.),,(3414.)*SIZE/(4000.)
        SIZE/2
        0
        -SIZE/2,,SIZE/2
        -SIZE/2,,-SIZE/2
        1,,-400000
        -SIZE/2,,-SIZE/2
        -SIZE/2
SEVEN→  3,
        -SIZE/2,,SIZE
        SIZE/2,,SIZE
        0
        SIZE/2,,SIZE
        0,,-SIZE
        0
        SIZE/3
        SIZE/2,,SIZE/3
EIGHT→  2,1,,377,777
        SIZE
        3*SIZE/5
        1,,377777
        SIZE/5
        0,,-2*SIZE/5
NINE→   3,1,,400,0
        SIZE/2,,SIZE/2
        SIZE/2
        0
        SIZE/2,,SIZE/2
        SIZE/2,,-SIZE/2
        1,,-200000
        SIZE/2,,-SIZE/2
        0,,-SIZE/2
ZERO→   4,1,,-200,-0
        -SIZE/2,,SIZE/2
        SIZE/2
        0
        SIZE/2,,SIZE/2
```

```
          SIZE/2,,-SIZE/2
          1,,-200000
          SIZE/2,,-SIZE/2
          0,,-SIZE/2
          0
          -SIZE/2,,-SIZE/2
          -SIZE/2,,SIZE/2
AA→       3,
          BL
          SIZE
          0
          SIZE
          BR
          0
          -SIZE/4,,0
          SIZE/4,,0
BB→       6,
          TL
          BL
          0
          BL
          0,,-SIZE
          1,,200000
          0,,-SIZE
          0,,-2*SIZE/5
          1,,200000
          SIZE/5
          3*SIZE/5
          0
          SIZE
          TL
          0
          -SIZE/2,,SIZE/5
          SIZE/5
CC→       3,1,,140,0
          (1574.)*SIZE/(4000.),,(3414.)*SIZE/(4000.)
          SIZE/2
          0
          -SIZE/2,,SIZE/2
          -SIZE/2,,-SIZE/2
          1,,140000
          -SIZE/2,,-SIZE/2
          0,,-SIZE/2
DD→       2,1,,-200,-0
          TL
          -SIZE/2,,0
          0
          BL
          TL
EE→       4,
```

```
        TR
        TL
        0
        TL
        BL
        0
        BL
        BR
        0
        -SIZE/2.,0
        SIZE/3.,0
FF→     3.
        TR
        TL
        0
        TL
        BL
        0
        -SIZE/2.,0
        SIZE/3.,0
GG→     5,1.,140,0
        (1574.)*SIZE/(4000.),.(3414.)*SIZE/(4000.)
        SIZE/2
        0
        -SIZE/2.,SIZE/2
        -SIZE/2.,-SIZE/2
        1.,200000
        -SIZE/2.,-SIZE/2
        0.,-SIZE/2
        0
        SIZE/2.,-SIZE/2
        SIZE/2.,0
        0
        SIZE/2.,0
        0
HH→     3.
        TL
        BL
        0
        -SIZE/2.,0
        SIZE/2.,0
        0
        TR
        BR
II→     3.
        TL
        TR
        0
        SIZE
        -SIZE
```

```
        0
        BL
        BR
JJ→     3,
        TL
        TR
        0
        SIZE
        0,,-3*SIZE/4
        1,,-200000
        0,,-3*SIZE/4
        -SIZE/4,,-3*SIZE/4
KK→     3,
        TL
        BL
        0
        -SIZE/2,,-SIZE/3
        TR
        0
        -SIZE/4,,0
        BR
LL→     2,
        TL
        BL
        0
        BL
        BR
MM→     4,
        BL
        TL
        0
        TL
        0
        0
        0
        TR
        0
        TR
        BR
NN→     3,
        BL
        TL
        0
        TL
        BR
        0
        BR
        TR
OO→     4,1,,-200,-0
        -SIZE/2,,SIZE/2
```

```
       SIZE/2
       0
       SIZE/2,,SIZE/2
       SIZE/2,,-SIZE/2
       1,,-200000
       SIZE/2,,-SIZE/2
       0,,-SIZE/2
       0
      -SIZE/2,,-SIZE/2
      -SIZE/2,,SIZE/2
PP→    4,
       BL
       TL
       0
       TL
       SIZE
       1,,-200000
       SIZE
       SIZE/2
       0
       0
      -SIZE/2,,
QQ→    5,1,,-200,-0
      -SIZE/2,,SIZE/2
       SIZE/2
       0
       SIZE/2,,SIZE/2
       SIZE/2,,-SIZE/2
       1,,-200000
       SIZE/2,,-SIZE/2
       0,,-SIZE/2
       0
      -SIZE/2,,-SIZE/2
      -SIZE/2,,SIZE/2
       0
       0,,-SIZE/2
       BR
RR→    5,
       BL
       TL
       0
       TL
       SIZE
       1,,-200000
       SIZE
       SIZE/2
       0
       0
      -SIZE/2,,0
       0
```

```
        0
        BR
SS→     2,1,,240,0
        (1574.)*SIZE/(5000.),,(4414.)*SIZE/(5000.)
        3*SIZE/5
        1,,-240000
        SIZE/5
        0,,-2*SIZE/5
TT→     2,
        TL
        TR
        0
        SIZE
        0,,-SIZE
UU→     3,
        TL
        -SIZE/2,,-SIZE/2
        0,1,,200,0
        -SIZE/2,,-SIZE/2
        0,,-SIZE/2
        0
        SIZE/2,,-SIZE/2
        TR
VV→     2,
        TL
        0,,-SIZE
        0
        0,,-SIZE
        TR
WW→     4,
        TL
        -SIZE/4,,-SIZE
        0
        -SIZE/4,,-SIZE
        0
        0
        0
        SIZE/4,,-SIZE
        0
        SIZE/4,,-SIZE
        TR
XX→     2,
        TL
        BR
        0
        BL
        TR
YY→     3,
        TL
        0
```

```
        0
        0
        0,.-SIZE
        0
        0
        TR
ZZ→     3,
        TL
        TR
        0
        TR
        BL
        0
        BL
        BR
PLUS→   2,
        0,.-SIZE/2
        SIZE/2
        0
        SIZE/2,.
        -SIZE/2,.
MINUS→  1,
        SIZE/2,.
        -SIZE/2,.
DOT→    1,
        -SIZE
        -SIZE
COMMA→  1,
        -SIZE
        -5*SIZE/6
        **IBM TAPE PROGRAM
        ** IBM 910-24
45SRN→  1STE  45EXIT
        MKN  45NSW
        JPQ  #+3
45SR→   1STE  45EXIT
        MKZ  45NSW
        MKZ  45GARBSW
45SRGARB→
        MKZ  45RWSW
        #JPQ  45TYPECHK
        11RSX  45X LIST
        INX  45X LIST+1
        JPQ  45GO
45GARB→ 1STE  45EXIT
        MKN  45GARBSW
        MKZ  45NSW
        DPX  45CURRENT
        JPQ  45SRGARB
45SWN→  1STE  45EXIT
```

```
        MKN   45NSW
        JPQ #+3
45SW→   1STE  45EXIT
        MKZ   45NSW
        MKN   45RWSW
        *JPQ  45TYPECHK
        SKX 45X LIST
        MKZ   45GARBSW
45GO→   DPX 45X 45B
        MKZ META TX2MSW
        34SPG ( 604,331,,330,333)
        11RSX 45X 45NUM     **TOGGLE
        SKZ   45NSW
        11RSX 45X 45CURRENT
        2DPX 45X 45LIST
        RFD 45#+2
        JPD #
        1IOS 41 20000
        1IOS 54 30000
        1IOS 54 40000
        MKZ META 45DORWD
        MKZ   45REVSW
        SXD   45CURRENT*
        *JPQ  45DORWD
45GO2→  SKZ   45NSW
        JPQ   45RW?
        SKZ   45GARBSW
        JPQ   45READ
        SXD 45X 0
        *JPQ  45DORWD
        DEX 45X 45CURRENT*
        *-1JPX 45X 45SCHFWD
        INX 45X 1
        *1JNX 45X 45SCHBWD
        JPQ   45RW?
45SCHFWD→
        SKX 45X2 1
45SF1→  45GF
        SKX 54 3160.
        SNN   45LPSW
        SKX 54 16000.
        *JPQ (SQ45DELAY)
         45GFR
45SF1A→RXF 54 45IT1
        *1TSD  45WA
        1IOS 54 30000
        1IOS 54 30300
        JPQ #-3
45SF2→  45SRM
        45DELAY≡1300.
```

```
        ¹ADX 45X2 45CURRENT
        SKZ 45GARB
        JPQ 45READ
        *-¹ JPX 45X 45SF1
45RW?→  SKZ 45RWSW
        JPQ 45WR
45READ→ 45GF
        SKX 54 3160.
        SNN 45LPSW
        SKX 54 16000.
        *JPQ (SQ45DELAY)
        RXF 54 45IT3
        45GFR
        *¹TSD 45WA
        ²SED 45LIST
        JPQ 45COMMON
        SKZ 45GARBSW
        JPQ 45SF1A
        *JPQ 45ERR
45COMMON→
        ¹IOS 54 30300
        *¹TSD 45LIST
        ¹IOS 54 30000
        ¹¹RSX 45X2 45LIST
        ²AUX 45X2 45LIST    **START SC CALC
        ¹¹RSX 45X 45LIST
        ¹¹AUX 45X 45B
        DEX 45X 1
        ¹DPX 45X 45TSD
        SXL 45X 100000
        *JPQ 45ERR
        ¹¹RSX 45X 45LIST
        ¹SKX 45X1 45X 0
        ¹IOS 54 30300
        INX 45X 1
        *¹JNX 45X*+2
        JPQ 45ENDBLK
45TSD→  *²TSD 45X 45LIST    **MOD
        ¹IOS 54 30000
        ²AUX 45X2 45TSD*
        ¹IOS 54 30300
        *¹TSD 45TSD*
        ¹IOS 54 30000
        ¹AUX 45X2 45TSD*
        ¹IOS 54 30300
        *¹JNX 45X 45TSD
45ENDBLK→
        *¹TSD E    **DUMMY SLOT
        ¹IOS 54 30000
        ¹IOS 54 30300
```

```
          SKZ  45RWSW
          JPQ  45W2
 45PREXIT→
          *1TSD  45WA  **SUMCHK
          1IOS 54 30000
           45SRM
          1AUX 45X2 45WA
          *JPX 45X2 45ERR
          *JNX 45X2 45ERR
          45DELAY≡1516.
          SKX  45X 1
          1ADX 45X 45CURRENT
          RXF 76  45EXIT*
          SKN  45RWSW **WRITING?
          RXF 76  45MERGE
          MKZ  META 45NORMSG
          **SEQUENCE 66
 45MSG→  *1DPX 45LW 45LWRET
          RFD 45LW*+1
          1IOS 45LW 30000
          *LDE  45LIST
          STE  45MWA3
          2DPX  45LIST
          RXF 54  45RESETIT
 45MK1→  6TSD ( 60,30,,21,34)        **CR.I..B.M
          5TSD  45MK1*
          4TSD  45MK1*
          3TSD  45MK1*
 45MK2→  6TSD ( 70,41,,46,63)        **SP.R..W.BLK
          MKZ  META TX2MSW2
          SKZ  45RWSW
          JPQ  45MW
          5TSD  45MK2***R
 45M2→   12RSX 45X2 45MWA3  **IDENT
          6TSD  45MK2*
          6TSD  45MK2*
          MKZ 4.10 45M2A
 45M2A→  SKX  45X 2
 45M3→   *1DPX 45X2 E
          *1ITE (..7.7)
          1STE 45X 45MWA
          1DPX 45X2 45MWA2
          CYR  45MWA2
          CYR  45MWA2
          CYR  45MWA2
          11RSX 45X2 45MWA2
          *-1JPX 45X 45M3
          MKZ  45ZSW
          MKZ 4.10 45M4
 45M3A→  1SKX 45X 2
```

```
          LMH  GX7A   022                                125
45M4→   14RSX  45X2  45M6*
        SKZ   45ZSW
        JPQ   45M5
        SXD  45X2  0
        JPQ   45M6
        MKN   45ZSW
45M5→   *DPX  45X2  E
        3TSD   E
45M6→   *11LDE  45X  45MWA+2
        37STE  45X  45MWA+2
        *1JNX  45X  45M4
        SNN  4.10  45M4
        JPQ   45M3A
        SKN   45ZSW
        3TSD  (  0)
45M6A→  6TSD   45MK2***SPACE
TX 2MSW 2→
        SZZ  META#
        JPD   45LWRET*
        6TSD   45MK2***SPACE
45NORMSG→
        SZZ  META#
        JPQ   45ERRMSG
        11RSX  45X2  45MWA3   **LENGTH
        SNN  4.10  45M2A
        JPQ   45M2A
        1SKX  45X  3
45M7→   *13LDE   45WA
        *31TE  (  77)
        13RSX  45X2  E
        SXL  45X2  52
        DEX  45X2  26
        SXL  45X2  20
        JPQ   45M8
        SXL  45X2  12
        DEX  45X2  6
        SXD  45X2  0
        SKX  45X2  0   **AVOID -0
45M8→   *DPX  45X2  E
        3TSD   E
        1SKX  45X2  3
        CYR   45WA
        *1JNX  45X2#-1
        *1JNX  45X  45M7
        SKZ   45GARBSW
        DPX   45CURRENT
TX 2MSW→SKN  META#
45LWRET→
        JPD   ?
        MKN  META  TX 2MSW 2
```

```
            11RSX 45X2 TX2WA3
            JPQ 45M2+1
45ERRMSG→
            6TSD ( 67,24,,41,41)       **RED ERR
            5TSD #-1*
            4TSD #-2*
            3TSD #-3*
            3TSD 45MK2***BLACK
            6TSD 45MK1*
            6TSD 45MK1*
            6TSD 45MK1*
            JPQ 45LWRET*
45WR→       45GFW
            SKX 54 5000.
            SNN 45LPSW
            SKX 54 76000.
            *JPQ (SQ45DELAY)
            RXF 54 45IT3
            *2TSD 45LIST        **IDENT
            JPQ 45COMMON
45W2→       1DPX 45X2 45WA
            1COM 45WA
            1TSD 45WA **SUMCHK
            1IOS 54 30000
            *45WCS
            SKZ 1.9 E   **NOT EOT?
            *JPQ 45ERR
            45DELAY≡3516.
            SKX 45X2 1
            1ADX 45X2 45CURRENT
            MKN 45REVSW
            SKX 45X 0
45SCHBWD→
            1SKX 45X2 1
            45DELAY≡11160.
45SR1→      45REV
            RXF 54 45IT2
            *1TSD 45WA
            1IOS 54 30000
            1IOS 54 30300
            JPQ #-3
45SR2→      45DELAY≡2000.
            45SRM
            45DELAY≡1300.
            *1ADX 45X2 45CURRENT
            1SED (-0)
            DPX 45CURRENT
            *1JNX 45X 45SR1
            45DELAY≡11160.
            SKN 45REVSW
```

127

```
        JPQ  45RW?
45SC→   11RSX 45X 45LIST
        DEX 45X 1
        1SKX 45X145X 0
        SKX 45X2 0
         45GF
        45DELAY≡316 0.
        RXF 54 45IT3
         45GFR
45SC2→  *2TSD  45WA2
        1IOS 54 30000
        2AUX 45X2 45SC2*
        1IOS 54 30300
        *1TSD  45SC2*
        *IOS 54 30000
        SED   45TSD*
        JPQ *+2
        *JPQ  45ERR
        1AUX 45X2 45SC2*
        1IOS 54 30300
        *1JNX 45X 45SC2
        *1TSD  E      **DUMMY SLOT
        1IOS 54 30000
        1IOS 54 30300
        JPQ  45PREXIT
45DORWD→
        1STE  45RWDEXIT
        SZN META 45DORWD
        JPQ  45RWDEXIT*
        MKZ  45LPSW
        DPX  45CURRENT
        20 45RWD
        45DELAY≡316 00.
45RWDEXIT→
        JPQ * **MOD
45RESETIT→
        1IOS 54 30000
        *1TSD ( 10000.)
        21IOS 54 30300
        SKN 4.10 200134
        RXF 57 200134*
        JPD *-2
45SWITCHES→
        0
45WA→   0
        **SEQUENCE 54
45IT1→  1TSD ( 400.,,200.)
        1IOS 54 30000
        RFD 45 45SF2
        JPD *
```

LMH GX7A 025 128

```
45IT2→  ¹TSD ( 400.,,200.)
        ¹IOS 54 30000
        RFD 45 45SR2
        JPQ #
45IT3→  ²TSD ( 400.,,200.)
        ¹IOS 54 30000
        RFD 45 45ERR
        JPQ #
45TYPECHK→
        ¹STE 45TYPECHKX
45TC1→  *¹IOS 46LW 0
        *SKN 2.6 E   **CONNECTED?
        JPQ 45TYPECHKX*
        *SKN 2.8 E   **STATUS?
        JPQ 45TC1
        SKN 2.9 E    **FLAG
45TYPECHKX→
        JPQ ?
        JPQ 45TC1
        **ERROR ROUTINES
45ERR→  *¹STE 45ERRSTOP
        *45SRM
        45DELAY≡20000.
        ¹DPX 45CURRENT
        45RWD
        45DELAY≡31600.
        ¹IOS 45 20000
        MKN META 45NORMSG
        RXF 76 45EXIT*
        JPQ 45MSG
45ERRSTOP→
        0
45MW→   ⁴TSD 45MK2***W
        JPQ 45M2
45MWA→  0
        0
        0
45MWA2→ 0
45MWA3→ 0
45B→    0
45MERGE→
        ¹¹RSX α LIST
        INX α 1
        ¹DPX α LIST2
        INX α MASTERS-LIST
LIST2→  SKX γ ?      **REL RD ADDR
        ¹¹RSX β 45TSD      **END OF RD AREA
        DEX β LIST
45MCA1→SKX SIα 0
        ¹⁵AUX SIα LIST
```

```
      JPQ   45MCA3
45MCA2→11RSX TIS LIST
      SXD T 0
      JPQ ¤+2
      1ADX YIS LIST
      1ADX YIS LIST+1
      2ADX YIS LIST+1
45MCA3→DEX S 2
      SXL SIα 0
      JPQ  45MCA2
      16AUX αIα LIST
      SXL BIα 0
      JPQ  45MCA1
45MERGE2→
      11RSX α LIST2
      INX α MASTERS-LIST
      LGORR≡SPECB×α=S→45MG3
      *JPQ  45PUT
      11RSX β LIST2
      11AUX βIβ LIST
      1DPX β LIST
      DEX α 2
      SKX β 2002
      2DPX βIα LIST
      *JPQ  45PUT
45EXIT→JPQ  ?
45MG3→ 1STE  45MG3X
      SKX β MASTERS-LIST **β=OLD RINGS
      LGORR≡SPECB×β=S→45MG4
      *JPQ  45SWITCHRINGS
45MG3X→JPQ  ?
45MG4→ 1STE  45MG4X
      *LDE β LIST+NAME
      SED α LIST+NAME
      JPQ ¤+2
45MG4X→JPQ  ?
      1DPX β  45MG5A       **SAVE β LEVEL
      LGORR≡SPECB×α=S→45MG5
      *JPQ  45FREE
      JPQ  45MG3X*
45MG5→ 1STE  45MG5X
45MG5A→SKX β ?
      LGORR≡SPECB×β=S→45MG6
      *JPQ  45SWITCHRINGS
45MG5X→JPQ  ?
45MG6→ 1STE  45MG6X
      *LDE β LIST+NAME
      SED α LIST+NAME
      JPQ ¤+2
45MG6X→JPQ  ?
```

LMH GX7A 027 130

```
        11RSX SIα LIST+(SPECB)+1
        SXD SIα SPECB+1      **RING EMPTY?
        JPQ  45MG7
        COMBHL≡SPECB*α→SPECB*B
45MG7→  *JPQ  45FREE
        JPQ  45MG5X*
45SWITCHRINGS→
        *SKX yIB 0
        *JMP #+2
45FREE→*SKX y FREES-LIST
        1STE  45FREEX
        CHGRL≡TYPE*α→SPECB*y
45FREEX→
        JPQ  ?
45PUT→  1STE  45PUTX
        SKX y FREES-LIST
        PUTL≡TYPE*α→SPECB*y
45PUTX→JPQ  ?
45LAST INSTR→
        #-45SRN+1
        **TX-2 TAPE PROGRAMS
        **TX2 921-3
TX2WR→  1STE  45EXIT
        *JPQ  45TYPECHK
        *JPQ  TX2SCOPE
        MKN  45RWSW
        JES 35 TX2TOGCHK
        2DPX 34 45MWA3
        SKX 35 LIST **START CORE
        1DPX 35 45B
        11RSX 37 LIST
        INX 37 LIST-1        **END CORE
TX2K1→  SKX 36  333427
        2DPX 36 LIST
        1DPX  45WA  **SUM CHK
        WRS,TX2ERR
TX2MSG→*JPQ  TX2RESET
        11RSX 45X 45LIST   **LENGTH
        1DPX 45X TX2WA3
        MKZ  45GARBSW
        MKZ META 45NORMSG
        12RSX 45X(TPKB)+3  **NXT FREE BLOCK
        1DPX 45X 45MWA3
        RXF 76  45EXIT*
        SKN  45RWSW
        RXF 76  45MERGE
        RFD 45LW#+1
        1ICS 45LW 30000
        6TSD  45MK1***CR
TX2K2→  6TSD ( 43,47,,55,2)        **TX-2
```

```
        5TSD  TX2K2*
        4TSD  TX2K2*
        3TSD  TX2K2*
        6TSD  45MK2***SP
        3TSD  45MK1***M
        6TSD  TX2K2***T
        JPQ  45MK2
TX2SCOPE→
        1STE  TX2SCOPEX
        *1IOS 54 30000
        1IOS 54 40000
        1DPX 45LW 45LWRET
        *1DPX 60 TX2SCOPERET
        SKX 60(JPD *)
        2DPX 34 TX2WA1
        1DPX 35 TX2WA1
        2DPX 36 TX2WA2
        1DPX 37 TX2WA2
        MKN META TX2MSW
TX2SCOPEX→
        JPQ  ?
TX2ERR→*JPQ  TX2RESET
        SKX 45LW 45LWRET*
        RFD 76 45EXIT*
TX2RESET→
        1STE  TX2RESETX
        12RSX 34 TX2WA1
        11RSX 35 TX2WA1
        12RSX 36 TX2WA2
        11RSX 37 TX2WA2
TX2SCOPERET→
        RXF 60 ?
        2DPX  45LIST
        RXF 54 45RESETIT
TX2RESETX→
        JPQ  ?
TX2WA1→ 0
TX2WA2→ 0
TX2WA3→ 0
TX2RD→ 1STE  45EXIT
        *JPQ  45TYPECHK
        *JPQ  TX2SCOPE
        MKZ  45RWSW
        JES 35 TX2TOGCHK
        2DPX 34 45MWA3
        11RSX 35 LIST
        INX 35 LIST+1         **LOW CORE
        1DPX 35 45B
        1DPX 35 TX2ST
        DEX 34 10
```

```
        1DPX  45WA  **SUM CHK
        *JPQ  (SEARCHΔ)
        JPQ   TX2ERR
        *JPQ  TX2RDLOOP
        JPQ   TX2ERR
        JPQ   TX2MSG
TX2RDLOOP→
        1STE  (TPKB)+2
        MKN  1.4(TPKB)+9.
        MKZ  3.8  TX21STRD    **MAKE JPQ
        SKX  41(IOAB)+3
        2DPX  35(TPKB)+1
        2DPX  34  A
        22ADD  (-10,,10)
        22STA  (TPKB)+1
        MKZ  META  TX2ST
        SKX  36  1
        SKX  35  0
        1IOS  46  30100
TX2RD1→*6TSD  B      **CM
        1IOS  46  30020      **RLF2
        21STA  (TPKB)
        *5TSD  B      **FM
        22STB  (TPKB)
        *4TSD  B      **DUMMY
        21SED  A
        JPQ  TX2GBM
TX2BMERR→
        *JPQ  (TURNOFFΔ)
        SKX  36  2
        *JPQ  (ERRLOOPB)*
TX2GBM→*4TSD  A      **SUMCHK1
        *3TSD  A      **SC2
        1SKX  34  177
        *6TSD  B
TX2DATA→
        *5TSD  B
        2ADD  B
        *4TSD  B
        *3TSD  B
        1ADD  B
        SKN  META  TX2ST
TX2ST→  STB  35  45LIST      **MOD
TX21STRD→
        *JPQ  TX2RD3**MOD TO *14JNX TX2RD3
        *6TSD  B      **DATA OR SC1
        *1JNX  34  TX2RDCONT
TX2RD2→*3TSD  B      **SC2
        1IOS  46  30120
        2ADD  B
```

```
        *1JNA (TURNOFFΔ)
        *1JNA (ERRLOOPB)*
        *1JPA (TURNOFFΔ)
        *1JPA (ERRLOOPB)*
        22ADD (-10,,10)
        12RSX 34 B
        1ADX 34 45WA**CONT SC
        *1JNX 35 TX2RD1
        *JPQ (TURNOFFΔ)
        21STA (TPKB)+3
        1IOS 41 20000
        JPQ (ERRLOOPB)+6
TX2RDCONT→
        *1JNX 35 TX2DATA
        MKN META TX2ST
        JPQ TX2DATA
TX2RD3→*11RSX 37 45LIST  **LENGTH
        22SED TX2K1**IDENT
        JPQ TX2RD4
TX2RD3A→
        *JPQ (TURNOFFΔ)
TX2RD3B→
        TYPEL.635*(606735,,366360)
        RFD 46 TX2ERR
TX2RD4→11AUX 37 45B
        DEX 37 1
        *6TSD B     **DATA OR SC1
        1DPX 37 TX2ST
        1DPX 37 45TSD
        SXL 37 100000
        JPQ TX2RD3A
        11RSX 35 45B
        DEX 35|37 0
        MKN 3.8 TX21STRD  **MAKE JNX
        *1JNX 34 TX2RDCONT
        JPQ TX2RD2
TX2TOGCHK→
        RFD 46*+2
        JPQ *
        *11RSX 34 TX2TOG
        *3ITE TX2IK
        4SED TX2IK
        *JPX 34|35 0
        JPQ TX2RD3B
RI→     JPQ 377750
CL→     JPQ 200000
ST→     JPQ 200001
LAST→   ZZLAST
```

CONS 15 SEPT 134

IES B007 001

10S=021407	*EITH2	PARAERR=020446
1S=021423	FIX	PARAERRX=020462
2S=021420	FORCE=021553	PICTURES
32S=021404	FORCEX=021601	PNNU1=021430
32ST=021425	-GETVAL	PNNU2=021476
32SX=021427	HEADING1=020401	PNNU1X=021475
3SET=021303	HEADING1X=020445	PNNUGET=021522
3SETX=021330	HEADING2A=020425	PNNUT=021435
4S=021415	HEADING2=020423	PNNUT1=021510
6FSC=021331	HOLDL=021533	PNNUT2=021515
6FSCX=021403	HOLDLX=021552	PNNUT1X=021514
6S=021412	HOVSCOMP=021103	PNNUT2X=021521
BADOV	HOVSX=021144	PNNUGETX=021532
C1=022441	HOVSCOMP1=021145	PPDERR=020463
C10=022725	HOVSCOMP2=021150	PPDERRX=020477
C11=022751	IBCOMPX=021220	PRLCOMP=020500
C12=022775	IBFSCOMP=021251	PRLCOMPEX=020557
C13=023021	IBVERTCOMP=021153	-PROD
C14=023045	IBVSCOMPX=021262	PSIZE
C15=023071	INCH	PVAL
C16=023115	IPCONS	PYTHAGORIAN
C2=022465	IVAL	-PYTH
C3=022511	IWHAT	RI=021610
C4=022535	LAST=021613	S
C5=022561	-LDAB	*SAVEa=021656
C6=022605	LIST	-SETIX
C7=022631	MASBL	SIZECOMP=021235
C8=022655	MD1=020641	SIZECX=021250
C9=022701	MD2=020644	SMASBL
CCFR	MD3=020647	SPECB
CCFR30=023746	MD4=020655	ST=021612
CCFR20=023756	MD5=020660	-STAB
CCFR14=023762	MDISCOMP=020560	STARTS=020400
CCFR10=023766	MDISCOMPX=020640	-SUBR
CCFR2=023774	MDT=020651	*SUBR1
CL=021611	MDT1=020662	-SUMM
CN10=023141	MDX=020654	SVAL
CNLAST=023165	MDX1=020665	T
CONSTK	MIDP1=021263	TPTLCOMP=020750
CONSTRAINTS	MIDP2=021273	TPTLCOMPX=020777
CVTS	MIDP1X=021272	TPVALS
DEGEN	MIDP2X=021302	*TS=021657
DEGEN1=023760	MSCOMP=020666	*TT=021660
DELTA2=021604	MSCOMPX=020747	TYPE
DELTA1=021602	-NCONGEN	VA
DELTA3=021606	-NCONGENSP	VARIABLES
-DIFF	NLIST	VARLOC
DISPLAY	NLISTTT=022000	-VDIFF
-DISTANCE	NUMRAT	WHERE

135

```
                        IES  8007  002

 DISTCOMP=021221        ONCIRCLES                *WHERE IS
*DIST=021655            ONCIRCCOMP=021035        *ZZLAST=021661
 DISTCOMPX=021254       ONCIX=021102             Y
*EITHER                 ONLINES                  0
*EITH3                  ONLINECOMP=021000        6
*EITH1                  ONLNX=021034             (
*EITH                   ORIGIN                   8
                                                 2
```

```
-------------------------------------------------------------
              IES   B00/   003
BADOV= 200100                                  =     200100


CONSTK= 3                                      =          3
CONSTRAINTS= 4*SMASBL+LIST+1                   =      24031
CVTS= 6       ** VARIABLE TO MOVE TO SATISFY THIS
                                               =          6
CCFR= LIST-2                                   =      23776


DEGEN=*JMP  DEGEN1                             =400500023760
DISPLAY= 5  **MASTER DISPLAY SUBROUTINE =                 5


*EITH3=                                        =     207440
*EITH1=                                        =     207410
*EITH=                                         =     207434
*EITH2=                                        =     207435


FIX=SKM 4.10 377722                            = 1712377722


IPCONS= 11*MASBL+PICTURES          ** INSTANCE - POINT C
                          ONSTRAINT            =      24441
IVAL= 20      **R COS θ, R SIN θ, X, Y         =         20 .
IWHAT= 14     **WHAT PIC THIS IS INSTANCE OF
                                               =         14
INCH=(2.)/(29.)                                =   43236713


LIST= 24000 **LIST STRUCTURE START             =      24000


MASBL= 24     **MASTER BLOCK LENGTH            =         24


NLIST= 22000          **MODEL EMPTY LIST STRUCTURE
                                               =      22000
NUMRAT=(-(8)/6)                                = 52525252525


ONCIRCLES= 13*MASBL+PICTURES                   =      24511
ONLINES= 12*MASBL+PICTURES                     =      24465
ORIGIN= 20400                                  =      20400


PICTURES= 22*SMASBL+LIST+1                     =      24155
PVAL= 20      ** COORDINATES OF POINT          =         20
PSIZE= 16     **SIZE OF THIS PICTURE           =         16
PYTHAGORIAN= 200007                            =     200007


SMASBL= 6     **SMALL MASTER BLOCK LENGTH =               6
S= 7                                           =          7
SVAL= 16      **VALUE OF SCALER                =         16
SPECB= 2      **SPECIFIC BLOCKS                =          2
*SUBR1=                                        =     207410


TPVALS= 5*MASBL+PICTURES **TYPICAL VARIABLES
                                               =      24321
```

```
---------------------------------------------------------------

                 IES   B007   004
TYPE= 0       **TIES TO SPECB IN MASTER BLOCK
                                                  =        0
T= 10                                             =       10

VA= LIST+PVAL                                     =    24020
VARLOC= 15   **LOCATION OF VARIABLES IN BLOCK
                                                  =       15
VARIABLES= 1*SMASBL+LIST+1                        =    24007

WHERE= 12    **LOCATION OF THING IN PICTURE
                                                  =       12

Y= 3                                              =        3

X= 1                                              =        1

A= 4                                              =        4

C= 5                                              =        5

B= 2                                              =        2

L= 6                                              =        6
```

-- ~~130~~ 138

IES B007. 003

```
**DEF  EITHER=P,Q,R,T,U,V→CODE
RSXS1*LIST+CODE
       JPXSEITH3
EITH1→ LDA (-(0))
       STA EITH
       1DPX0EITH-5
       REXSEITH3-EITH2-3
       1DPXSEITH2
       *BPQ SEITH2+1
       RSXSEITH2
       JPA *+2
       COM A
       SUB EITH
       JPA *+4
       ADD EITH
       STA EITH
       3DPXSEITH2
-1 JPXSEITH1+4
       REX0*
       3RSXSEITH2
INXS1
       DPXS1*LIST+CODE
       JPQ EITH3+2
EITH→  0
EITH2→ 0          **BEST S..S
       *JMP P
       *JMP Q
       *JMP R
       *JMP T
       *JMP U
       *JMP V
EITH3→ SXLSEITH3-EITH2
       JPQ EITH1
       *BPQSEITH2
**END

**DEF. DIFF=A→B=C→D
LDA A
SUB B
*JOV D
STA C
**END

**DEF  LDAB=P
LDA P
LDB P+1
**END

**DEF  STAB=P
STA P
```

IES B007 008

```
STB P+1
--END

--DEF  SUMM=A-B=C-D
LDA A
ADD B
*JOV D
STA C
--END

--DEF  PROD=A*B/C=D-E
LDA A
MUL B
DIV C
*JOV E
STA D
--END

--DEF  SETIX=S,β,γ,δ,ε,λ
       RSXS|0LIST+CVTS+2
       RSXβ|0LIST+CVTS+4
       RSXγ|0LIST+CVTS+6
       RSXδ|0LIST+CVTS+10
       RSXε|0LIST+CVTS+12
       RSXλ|0LIST+CVTS+14
--END

--DEF  NCONGEN=NAME,SIZE,LET,COMP,NCON,CHVAR
       MASBL,4,,CONSTRAINTS-LIST
       #-MASBL-NLIST,,#+MASBL-NLIST
       -2,
       #-NLIST,,#-NLIST
       NAME
*JMP CCFR+1
       DEGEN   **HOWBIG
       0       **GETIT
       DEGEN   **MOVIT
       SIZE
       LET
       CONSTK
       0       **TUPLE
       0       **VARLOC
*JMP CCFR-COMP
       NCON
       CHVAR
       0
       0
       0
--END
```

```
--------------------------------------------------

                    IES    B007    ∙07

▸▸DEF  WHEREIS≡δ→P
       REX∙|δ
       RSXS|∙LIST+TYPE
       ∙BPQSLIST+WHERE
       STA P
       STB P+1
▸▸END

▸▸DEF  DISTANCE≡Y→δ=R→BADOV
       WHEREIS≡Y→DELTA1
       WHEREIS≡δ
       SUB DELTA1
       ∙JOV BADOV
       EXA B
       SUB DELTA1+1
       ∙JOV BADOV
       ∙JPQ PYTHAGORIAN
       ∙JOV BADOV
       STA R
▸▸END

▸▸DEF  GETVAL≡P,Q,R,U×∙→V
       RSXS|∙LIST+TYPE
       RSXS|SLIST+VARLOC
       LDAS|∙LIST+P
       STA V+P
       LDBS|∙LIST+Q
       STB V+Q
       LDCS|∙LIST+R
       STC V+R
       LDDS|∙LIST+U
       STD V+U
▸▸END

▸▸DEF  VDIFF≡δ→Y=R→BADOV
       WHEREIS≡Y→R
       WHEREIS≡δ
       SUB R
       ∙JOV BADOV
       STA R
       DIFF≡B→R+1=R+1→BADOV
▸▸END

▸▸DEF  NCONGENSP≡CODE,NAME,SIZE,LET,COMP,NCON,CHVAR
       MASBL,4,,CONSTRAINTS-LIST
       CODE
       -2,
       ∙-NLIST,,∙-NLIST
       NAME
       ∙JMP CCFR+1    **DISPLAY
```

```
-----------------------------------------
            IES  B007  *1*
     DEGEN  **HOWBIG
     *
     DEGEN  **MOVIT
     SIZE
     LET
     CONSTK
     *        **TUPLE
     *        **VARLOC
     *JMP CCFR-COMP
     NCON
     CHVAR
     *
     *
     *
**END

**DEF  SUBR=P
     'STE SUBR1
     P
SUBR1- JP0 *
**END

**DEF  PYTH=P-Q=R-U
     LDA P
     LDB P+1
     SUB Q
     *JOV U-(Q)+(Q)
     EXA B-(Q)+(Q)
     SUB Q+1
     *JOV U-(Q)+(Q)
*JPQ PYTHAGORIAN
     *JOV U
     STA R
**END
```

```
--------------------------------------------------------

               IES   B007   011

 NLIST1

NLISTTT-

      CNLAST-NLIST                       |000000 001165|022000

 IPCONS-LIST+NLIST1

      **INSTANCE  - POINT

C1-      NCONGENSP=(CN10-NLIST+1,,CONSTRAINTS+SPECB+1-
                              LIST)-
          ,(35,22,,37,30),(16,16,,0),43,1,2,2
       MASBL,4,,CONSTRAINTS-LIST  |024004 000031|    441
      (CN10-NLIST+1,,CONSTRAINTS+SPECB+1-LIST)-
                                 |001142 000034|    442
      -2,                        |775000 000000|    443
      0-NLIST,,0-NLIST           |000444 000444|    444
      (35,22,,37,30)             |035022 037030|    445
      0JMP   CCFR+1**DISPLAY     |400500 023777|    446
       DEGEN        **HOWBIG     |400500 023760|    447
       0                         |000000 000000|022450
       DEGEN        **MOVIT      |400500 023760|    451
      (16,16,,0)                 |016016 000000|    452
       43                        |000000 000043|    453
       CONSTK                    |000000 000003|    454
       0      **TUPLE            |000000 000000|    455
       0      **VARLOC           |000000 000000|    456
      0JMP   CCFR-1              |400500 023775|    457
       2                         |000000 000002|022460
       2                         |000000 000002|    461
       0                         |000000 000000|    462
       0                         |000000 000000|    463
       0                         |000000 000000|    464
      **THING ON LINE
C2-      NCONGENSP=(CONSTRAINTS+SPECB+1-LIST,,0-NLIST+
                             MASBL),-
          (35,30,,33,36),(16,16,,0),33,2,1,3
       MASBL,4,,CONSTRAINTS-LIST  |024004 000031|    465
      (CONSTRAINTS+SPECB+1-LIST,,0-NLIST+MASBL)
                                 |000034 000512|    466
      -2,                        |775000 000000|    467
      0-NLIST,,0-NLIST           |000470 000470|022470
      -
           (35,30,,33,36)        |035030 033036|    471
      0JMP   CCFR+1**DISPLAY     |400500 023777|    472
       DEGEN        **HOWBIG     |400500 023760|    473
       0                         |000000 000000|    474
       DEGEN        **MOVIT      |400500 023760|    475
      (16,16,,0)                 |016016 000000|    476
       33                        |000000 000033|    477
       CONSTK                    |000000 000003|022500
       0      **TUPLE            |000000 000000|    501
       0      **VARLOC           |000000 000000|    502
      0JMP   CCFR-2              |400500 023774|    503
```

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------------------------------------------------

           IES   B007   012

    1                                   |000000 000001|   504
    3                                   |000000 000003|   505
    0                                   |000000 000000|   506
    0                                   |000000 000000|   507
    0                                   |000000 000000|022510
   **THING ON CIRCLE
C3-  NCONGEN=(41,31,,22,36),(16,16,,0),22,3,1,3
    MASBL,4,,CONSTRAINTS-LIST           |024004 000031|   511
   #-MASBL-NLIST,,#+MASBL-NLIST
                                        |000466 000536|   512
   -2,                                  |775000 000000|   513
   #-NLIST,,#-NLIST                     |000514 000514|   514
   (41,31,,22,36)                       |041031 022036|   515
   #JMP   CCFR+1                        |400500 023777|   516
    DEGEN          **HOWBIG             |400500 023760|   517
    0      **GETIT                      |000000 000000|022520
    DEGEN          **MOVIT              |400500 023760|   521
   (16,16,,0)                           |016016 000000|   522
    22                                  |000000 000022|   523
    CONSTK                              |000000 000003|   524
    0      **TUPLE                      |000000 000000|   525
    0      **VARLOC                     |000000 000000|   526
   #JMP   CCFR-3                        |400500 023773|   527
    1                                   |000000 000001|022530
    3                                   |000000 000003|   531
    0                                   |000000 000000|   532
    0                                   |000000 000000|   533
    0                                   |000000 000000|   534
   **VERTICAL THING
C4-  NCONGEN=(41,45,,21,30),(14,12,,0),24,4,1,1
    MASBL,4,,CONSTRAINTS-LIST           |024004 000031|   535
   #-MASBL-NLIST,,#+MASBL-NLIST
                                        |000512 000562|   536
   -2,                                  |775000 000000|   537
   #-NLIST,,#-NLIST                     |000540 000540|022540
   (41,45,,21,30)                       |041045 021030|   541
   #JMP   CCFR+1                        |400500 023777|   542
    DEGEN          **HOWBIG             |400500 023760|   543
    0      **GETIT                      |000000 000000|   544
    DEGEN          **MOVIT              |400500 023760|   545
   (14,12,,0)                           |014012 000000|   546
    24                                  |000000 000024|   547
    CONSTK                              |000000 000003|022550
    0      **TUPLE                      |000000 000000|   551
    0      **VARLOC                     |000000 000000|   552
   #JMP   CCFR-4                        |400500 023772|   553
    1                                   |000000 000001|   554
    1                                   |000000 000001|   555
    0                                   |000000 000000|   556
    0                                   |000000 000000|   557
```

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           IES   B007   013

    0                              |000000 000000|022560

    **HORIZ OR VERT LINE

C5-    NCONGEN=(42,45,,36,27),(16,14,,0),27,5,1,2

     MASBL,4,,CONSTRAINTS-LIST |024004 000031|   561

    #-MASBL-NLIST,,#+MASBL-NLIST

                               |000536 000606|   562

    -2,                        |775000 000000|   563

    #-NLIST,,#-NLIST           |000564 000564|   564

    (42,45,,36,27)             |042045 036027|   565

    *JMP   CCFR+1              |400500 023777|   566

     DEGEN       **HOWBIG      |400500 023760|   567

     0     **GETIT             |000000 000000|022570

     DEGEN       **MOVIT       |400500 023760|   571

    (16,14,,0)                 |016014 000000|   572

     27                        |000000 000027|   573

     CONSTK                    |000000 000003|   574

     0     **TUPLE             |000000 000000|   575

     0     **VARLOC            |000000 000000|   576

    *JMP   CCFR-5              |400500 023771|   577

     1                         |000000 000001|022600

     2                         |000000 000002|   601

     0                         |000000 000000|   602

     0                         |000000 000000|   603

     0                         |000000 000000|   604

    **THING PARALLEL TO LINE

C6-    NCONGEN=(33,43,,37,43),(16,16,,0),30,7,1,3

     MASBL,4,,CONSTRAINTS-LIST |024004 000031|   605

    #-MASBL-NLIST,,#+MASBL-NLIST

                               |000562 000632|   606

    -2,                        |775000 000000|   607

    #-NLIST,,#-NLIST           |000610 000610|022610

    (33,43,,37,43)             |033043 037043|   611

    *JMP   CCFR+1              |400500 023777|   612

     DEGEN       **HOWBIG      |400500 023760|   613

     0     **GETIT             |000000 000000|   614

     DEGEN       **MOVIT       |400500 023760|   615

    (16,16,,0)                 |016016 000000|   616

     30                        |000000 000030|   617

     CONSTK                    |000000 000003|022620

     0     **TUPLE             |000000 000000|   621

     0     **VARLOC            |000000 000000|   622

    *JMP   CCFR-7              |400500 023767|   623

     1                         |000000 000001|   624

     3                         |000000 000003|   625

     0                         |000000 000000|   626

     0                         |000000 000000|   627

     0                         |000000 000000|022630

    **MULTIPLE DISTANCE

C7-    NCONGEN=(42,30,,23,34),(22,20,,0),34,10,1,4

     MASBL,4,,CONSTRAINTS-LIST |024004 000031|   631
```

```
        IES   B007   #14
#-MASBL-NLIST,, #+MASBL-NLIST
                                        |000606 000656|    632
                                        |775000 000000|    633
-2,
                                        |000634 000634|    634
#-NLIST,,#-NLIST
                                        |042030 023034|    635
(42,30,,23,34)
                                        |400500 023777|    636
#JMP  CCFR+1
                                        |400500 023760|    637
 DEGEN          **HOWBIG
                                        |000000 000000|022640
 0      **GETIT
                                        |400500 023760|    641
 DEGEN          **MOVIT
                                        |022020 000000|    642
(22,20,,0)
                                        |000000 000034|    643
 34
                                        |000000 000003|    644
 CONSTK
                                        |000000 000000|    645
 0      **TUPLE
                                        |000000 000000|    646
 0      **VARLOC
                                        |400500 023766|    647
#JMP  CCFR-10
                                        |000000 000007|022650
 1
                                        |000000 000004|    651
 4
                                        |000000 000000|    652
 0
                                        |000000 000000|    653
 0
                                        |000000 000000|    654
 0
**MULTIPLE  SIZE
C#->  NCONGEN#(24,51,,30,42),(16,14,,0),42,11,1,2
 MASBL,4,,CONSTRAINTS-LIST |024004 000031|    655
#-MASBL-NLIST,, #+MASBL-NLIST
                                        |000632 000702|    656
                                        |775000 000000|    657
-2,
                                        |000660 000660|022660
#-NLIST,,#-NLIST
                                        |024051 030042|    661
(24,51,,30,42)
                                        |400500 023777|    662
#JMP  CCFR+1
                                        |400500 023760|    663
 DEGEN          **HOWBIG
                                        |000000 000000|    664
 0      **GETIT
                                        |400500 023760|    665
 DEGEN          **MOVIT
                                        |016014 000000|    666
(16,14,,0)
                                        |000000 000042|    667
 42
                                        |000000 000003|022670
 CONSTK
                                        |000000 000000|    671
 0      **TUPLE
                                        |000000 000000|    672
 0      **VARLOC
                                        |400500 023765|    673
#JMP  CCFR-11
                                        |000000 000001|    674
 1
                                        |000000 000002|    675
 2
                                        |000000 000000|    676
 0
                                        |000000 000000|    677
 0
                                        |000000 000000|022700
 0
**SCALER = DISTANCE
C#->  NCONGEN#(30,23,,24,42),(16,16,,0),23,12,1,3
 MASBL,4,,CONSTRAINTS-LIST |024004 000051|    701
#-MASBL-NLIST,, #+MASBL-NLIST
                                        |000656 000726|    702
                                        |775000 000000|    703
-2,
                                        |000704 000704|    704
#-NLIST,,#-NLIST
```

```
----------------------------------------
          IES   B007   015
(30,23,,24,42)                      |030023 024042|   705
#JMP  CCFR+1                        |400500 023777|   706
 DEGEN        **HOWBIG              |400500 023760|   707
 0     **GETIT                      |000000 000000|022710
 DEGEN        **MOVIT               |400500 023760|   711
(16,16,,0)                          |016016 000000|   712
 23                                 |000000 000023|   713
 CONSTK                             |000000 000003|   714
 0     **TUPLE                      |000000 000000|   715
 0     **VARLOC                     |000000 000000|   716
#JMP  CCFR-12                       |400500 023764|   717
 1                                  |000000 000001|022720
 3                                  |000000 000003|   721
 0                                  |000000 000000|   722
 0                                  |000000 000000|   723
 0                                  |000000 000000|   724
**SCALER = SIZE
C10→  NCONGEN=(30,42,,24,42),(14,14,,0),21,13,1,2
 MASBL,4,,CONSTRAINTS-LIST          |024004 000031|   725
#-MASBL-NLIST,,#+MASBL-NLIST
                                    |000702 000752|   726
-2,                                 |775000 000000|   727
#-NLIST,,#-NLIST                    |000730 000730|022730
(30,42,,24,42)                      |030042 024042|   731
#JMP  CCFR+1                        |400500 023777|   732
 DEGEN        **HOWBIG              |400500 023760|   733
 0     **GETIT                      |000000 000000|   734
 DEGEN        **MOVIT               |400500 023760|   735
(14,14,,0)                          |014014 000000|   736
 21                                 |000000 000021|   737
 CONSTK                             |000000 000003|022740
 0     **TUPLE                      |000000 000000|   741
 0     **VARLOC                     |000000 000000|   742
#JMP  CCFR-13                       |400500 023763|   743
 1                                  |000000 000001|   744
 2                                  |000000 000002|   745
 0                                  |000000 000000|   746
 0                                  |000000 000000|   747
 0                                  |000000 000000|022750
**FULL SIZE INSTANCE
C11→  NCONGEN=(33,33,,44,25),(12,12,,0),25,14,1,1
 MASBL,4,,CONSTRAINTS-LIST          |024004 000031|   751
#-MASBL-NLIST,,#+MASBL-NLIST
                                    |000726 000776|   752
-2,                                 |775000 000000|   753
#-NLIST,,#-NLIST                    |000754 000754|   754
(33,33,,44,25)                      |033033 044025|   755
#JMP  CCFR+1                        |400500 023777|   756
 DEGEN        **HOWBIG              |400500 023760|   757
 0     **GETIT                      |000000 000000|022760
```

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              IES  B007  016

     DEGEN        **MOVIT            |400500 023760|   761
    (12,12,,0)                       |012012 000000|   762
     25                              |000000 000025|   763
     CONSTK                          |000000 000003|   764
     0       **TUPLE                 |000000 000000|   765
     0       **VARLOC                |000000 000000|   766
    *JMP   CCFR-14                   |400500 023762|   767
     1                               |000000 000001|022770
     1                               |000000 000001|   771
     0                               |000000 000000|   772
     0                               |000000 000000|   773
     0                               |000000 000000|   774
    **MID POINT
C1 2-    NCONGEN=(37,23,,30,34),(16,16,,0),47,20,2,3
     MASBL,4,,CONSTRAINTS-LIST       |024004 000031|   775
    #-MASBL-NLIST,,#+MASBL-NLIST
                                     |000752 001022|   776
    -2,                              |775000 000000|   777
    #-NLIST,,#-NLIST                 |001000 001000|023000
    (37,23,,30,34)                   |037023 030034|   001
    *JMP   CCFR+1                    |400500 023777|   002
     DEGEN        **HOWBIG           |400500 023760|   003
     0       **GETIT                 |000000 000000|   004
     DEGEN        **MOVIT            |400500 023760|   005
    (16,16,,0)                       |016016 000000|   006
     47                              |000000 000047|   007
     CONSTK                          |000000 000003|023010
     0       **TUPLE                 |000000 000000|   011
     0       **VARLOC                |000000 000000|   012
    *JMP   CCFR-20                   |400500 023756|   013
     2                               |000000 000002|   014
     3                               |000000 000003|   015
     0                               |000000 000000|   016
     0                               |000000 000000|   017
     0                               |000000 000000|023020
    **6FOLD SIZE CONTROL
C1 3-    NCONGEN=(22,42,,25,6),(14,12,,0),6,21,7,1
     MASBL,4,,CONSTRAINTS-LIST       |024004 000031|   021
    #-MASBL-NLIST,,#+MASBL-NLIST
                                     |000776 001046|   022
    -2,                              |775000 000000|   023
    #-NLIST,,#-NLIST                 |001024 001024|   024
    (22,42,,25,6)                    |022042 025006|   025
    *JMP   CCFR+1                    |400500 023777|   026
     DEGEN        **HOWBIG           |400500 023760|   027
     0       **GETIT                 |000000 000000|023030
     DEGEN        **MOVIT            |400500 023760|   031
    (14,12,,0)                       |014012 000000|   032
     6                               |000000 000006|   033
     CONSTK                          |000000 000003|   034
```

```
----------------------------------------------
            IES  B007  017
  0     **TUPLE                    |000000 000000|   035
  0     **VARLOC                   |000000 000000|   036
 #JMP  CCFR-21                     |400500 023755|   037
  1                                |000000 000001|023040
  1                                |000000 000001|   041
  0                                |000000 000000|   042
  0                                |000000 000000|   043
  0                                |000000 000000|   044
 **POINTS NEXT NUMBER
C14-  NCONGEN#(35,35,,20,37),(16,14,,0),36,23,2,2
  MASBL,4,,CONSTRAINTS-LIST        |024004 000031|   045
 #-MASBL-NLIST,,#+MASBL-NLIST
                                   |001022 001072|   046
 -2,                               |775000 000000|   047
 #-NLIST,,#-NLIST                  |001050 001050|023050
 (35,35,,20,37)                    |035035 020037|   051
 #JMP  CCFR+1                      |400500 023777|   052
  DEGEN        **HOWBIG            |400500 023760|   053
  0     **GETIT                    |000000 000000|   054
  DEGEN        **MOVIT             |400500 023760|   055
 (16,14,,0)                        |016014 000000|   056
  36                               |000000 000036|   057
  CONSTK                           |000000 000003|023060
  0     **TUPLE                    |000000 000000|   061
  0     **VARLOC                   |000000 000000|   062
 #JMP  CCFR-23                     |400500 023753|   063
  2                                |000000 000002|   064
  2                                |000000 000002|   065
  0                                |000000 000000|   066
  0                                |000000 000000|   067
  0                                |000000 000000|023070
 **HOLD LENGTH
C15-  NCONGEN#(23,23,,36,27),(16,14,,0),46,24,1,2
  MASBL,4,,CONSTRAINTS-LIST        |024004 000031|   071
 #-MASBL-NLIST,,#+MASBL-NLIST
                                   |001046 001116|   072
 -2,                               |775000 000000|   073
 #-NLIST,,#-NLIST                  |001074 001074|   074
 (23,23,,36,27)                    |023023 036027|   075
 #JMP  CCFR+1                      |400500 023777|   076
  DEGEN        **HOWBIG            |400500 023760|   077
  0     **GETIT                    |000000 000000|023100
  DEGEN        **MOVIT             |400500 023760|   101
 (16,14,,0)                        |016014 000000|   102
  46                               |000000 000046|   103
  CONSTK                           |000000 000003|   104
  0     **TUPLE                    |000000 000000|   105
  0     **VARLOC                   |000000 000000|   106
 #JMP  CCFR-24                     |400500 023752|   107
  1                                |000000 000001|023110
```

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            IES   B007   020
       2                                  |000000 000002|   111
       0                                  |000000 000000|   112
       0                                  |000000 000000|   113
       0                                  |000000 000000|   114
      ** # = FORCE
CI6-  NCONGEN#(24,22,,41,25),(20,16,,0),50,25,1,1
       MASBL,4,,CONSTRAINTS-LIST          |024004 000031|   115
      #-MASBL-NLIST,,#+MASBL-NLIST
                                          |001072 001142|   116
      -2,                                 |775000 000000|   117
      #-NLIST,,#-NLIST                    |001120 001120|023120
      (24,22,,41,25)                      |024022 041025|   121
      #JMP   CCFR+1                       |400500 023777|   122
       DEGEN         **HOWBIG             |400500 023760|   123
       0      **GETIT                     |000000 000000|   124
       DEGEN         **MOVIT              |400500 023760|   125
      (20,16,,0)                          |020016 000000|   126
       50                                 |000000 000050|   127
       CONSTK                             |000000 000003|023130
       0       **TUPLE                    |000000 000000|   131
       0       **VARLOC                   |000000 000000|   132
      #JMP   CCFR-25                      |400500 023751|   133
       1                                  |000000 000001|   134
       1                                  |000000 000001|   135
       0                                  |000000 000000|   136
       0                                  |000000 000000|   137
       0                                  |000000 000000|023140
      **PARPLLEL LINES
CN10- NCONGENSP#(#-NLIST-MASBL,,CI-NLIST+1),-
           (37,41,,36,37),(22,20,,0),37,6,1,4
       MASBL,4,,CONSTRAINTS-LIST          |024004 000031|   141
      (#-NLIST-MASBL,,CI-NLIST+1)
                                          |001116 000442|   142
      -2,                                 |775000 000000|   143
      #-NLIST,,#-NLIST                    |001144 001144|   144
      -
           (37,41,,36,37)                 |037041 036037|   145
      #JMP   CCFR+1**DISPLAY              |400500 023777|   146
       DEGEN         **HOWBIG             |400500 023760|   147
       0                                  |000000 000000|023150
       DEGEN         **MOVIT              |400500 023760|   151
      (22,20,,0)                          |022020 000000|   152
       37                                 |000000 000037|   153
       CONSTK      .                      |000000 000003|   154
       0       **TUPLE                    |000000 000000|   155
       0       **VARLOC                   |000000 000000|   156
      #JMP   CCFR-6                       |400500 023770|   157
       1                                  |000000 000001|023160
       4                                  |000000 000004|   161
       0                                  |000000 000000|   162
```

150

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                IES  8007  021
          0                          |000000 000000|     163
          0                          |000000 000000|     164
CNLAST→   0                          |000000 000000|     165
 CCFR-301
CCFR30→   0                          |000000 000000|     746
          0                          |000000 000000|     747
          0                          |000000 000000|023750
        *JMP  FORCE                  |400500 021553|     751
        *JMP  HOLDL                  |400500 021533|     752
        *JMP  PNNU1                  |400500 021430|     753
        *JMP  PNNU2                  |400500 021476|     754
        *JMP  6FSC                   |400500 021331|     755
CCFR20→ *JMP  MIDP1                  |400500 021263|     756
        *JMP  MIDP2                  |400500 021273|     757
DEGEN1→'STE  *+1                     |013000 023761|023760
        JPQ  *                       |140500 023761|     761
CCFR14→ *JMP  IBFSCOMP               |400500 021251|     762
        *JMP  SIZECOMP               |400500 021235|     763
        *JMP  DISTCOMP               |400500 021221|     764
        *JMP  MSCOMP                 |400500 020666|     765
CCFR10→ *JMP  MDISCOMP               |400500 020560|     766
        *JMP  TPTLCOMP               |400500 020750|     767
        *JMP  PRLCOMP                |400500 020500|023770
        *JMP  HOVSCOMP               |400500 021103|     771
        *JMP  IBVERTCOMP             |400500 021153|     772
        *JMP  ONCIRCCOMP             |400500 021035|     773
CCFR2→  *JMP  ONLINECOMP             |400500 021000|     774
 ORIGIN1
```